

The Impact of Group Learning Strategy on the Academic Achievement of Students in the Sciences

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Abstract

The methodology used in any teaching-learning process is significant. The teaching approach can either enhance or hinder the learning process. Unfortunately, Secondary school science teachers employ a range of teaching strategies which have not improved learning outcomes to teach science-related subjects. As a result, the primary objective of this study is to determine how group learning techniques impact students' academic performance in scientific classrooms. The study used a non-randomization pretest, post-test control group quasi-experimental research design. The study's sample included 120 people from senior secondary school 2 (SSS 2) classes that were complete, with the target population being the full public Secondary School Science Two (SSS 2) student body in Ikere Ekiti LGA. The 50-item Science Achievement Test (SAT), developed by the researcher, served as the study's instrument. Four research questions and four research hypotheses served as the study's guiding principles. The study questions were answered, and the hypotheses were tested using a student's t-test with an alpha-level coefficient of 0.05. According to the study's findings, both groups were comparable before the experiment started, and the experimental group's learners performed better than those in the control group following the trial. The group learning technique fared better with female students than it did with their counterparts in the traditional group. Regarding academic achievement, there is no appreciable difference between male students taught using a group learning methodology and those taught using a conventional teaching style. Based on the study's findings, it was recommended, among other things, that all secondary school science and math classes should be taught using group learning strategies.

Keywords: Impact, Group Learning Strategy, Academic Achievement, Science Students

1. Introduction

Without a doubt, education is the cornerstone of a better future for every person, society, country, and global community. In the meantime, education starts the moment a person is born and lasts until that person takes their final breath. This suggests that everyone ought to be educated, especially in the formal educational system, beginning in childhood. Young children's minds can be thought of as a "tabula rasa" where they record all of their experiences. As a result, they have no awareness of the environment in which they live, which emphasizes the necessity of early childhood care and education, often known as preschool (Adekunle, 2019). This means that people of all ages and demographics in any country require education.

In a significant way, every country in the world now bases its industrial and technological development on its degree of scientific exploration and advancement as a standard. This is because the level of citizens' knowledge acquisition, skill mastery, and understanding of science provides the impetus for the country's economic, social, educational, civilized, and technical progress. According to Oghenevwe (2019), a nation's level of scientific advancement is and will always be a crucial and reliable metric to gauge the extent of its development. This further highlighted the real potential of science to contribute to the growth of any country. The main goal, focal point, and reason for including science in the curriculum in schools across the nation is to help students improve their general scientific literacy and knowledge. Thus, the idea of influencing knowledge pushes science education to the forefront as a way to instruct individuals in the practice and process of science.

The significance of science education in Nigeria and achievement in industrial and technical advancement cannot be overstated as long as the beauty and essentials of science and the scientific method are being recognized and there is a desire for it to be translated into innovation and invention.

The role being played in creating a modern nation, enhancing citizen development, and empowering people to have an egalitarian society, places science education at the forefront. Ihejiamaizu, Neji, and Agiande (2020) defined science as a process that is systematic in nature and design and characterized the explanation of the behaviour of the physical universe and the accumulation of knowledge through well-defined and systematic procedures of observation, experimentation, measurement, analysis, and recording of deductions derived from the hypotheses. In Nigeria, secondary school students learn the fundamentals of science, which is crucial for any country's growth and development. In Nigeria, the effects of science education are being felt throughout all facets of the economy, including education, agriculture, and the general standard of living. These are the indicators used to gauge the socio-economic and industrial growth of the country. Without question, science education is essential for every country that wants to improve its technology. The foundation of any nation's progress is technology, which is powerless to succeed without science. Any nation's success and development depend on science and technology. Technology is fundamental to any society's ability to create wealth, improve quality of life, and experience meaningful economic growth. It is a well-known fact that science, technology, and innovation hold the key to the present and future development of any country since they are essential to wealth creation, a higher standard of living, and genuine economic progress and social transformation. (Precious Ugwuzor, 2023).

Science education is imparting scientific knowledge to those who aren't typically seen as being part of the scientific community. These people can be students, farmers, market vendors, or an entire community. In Nigeria, scientific education focuses on clarifying students' misconceptions about science topics as well as on the teaching of science principles. According to Omosewo (2022), science education is crucial to the growth of any country, hence every country should treat it seriously in all educational institutions. Because of science education, many of the developed nations of the world have made great strides in science and technology.

Biology, chemistry, and physics are the three subjects that make up science education. According to Aina (2018), senior secondary schools in Nigeria have had a low enrollment in these subjects throughout the past year. The reasons for this low enrollment rate include students' persistently poor performance on WAEC and other external exams, society's contempt, teachers' ridicule, and teachers' low status (Okebukola, 2019). The country's ambition to meet the World Development Goal by 2030 could be a mirage if something drastic is not done soon to alter the narrative.

To accomplish scientific objectives, the methodology is especially important in all teaching-learning processes. The efficiency of a teacher's instruction can be enhanced or diminished by the approach used. When a teaching strategy is appropriate and effective, it strengthens the mental processes that form the basis of social power; on the other hand, if it is ineffective, it deters students' initiative and curiosity. This indicates that a teaching strategy can push either strong academic accomplishment or weak academic achievement. For the efficient and effective teaching of science subjects, there are various sorts of teaching methodologies. Conventional, demonstration, laboratory, field trip, assignment, and peer-teaching approaches are a few of these techniques (Kenni, 2020). Teaching techniques are ways for a teacher to make his arguments clear to his students so that the latter can learn efficiently. Teaching strategies, such as subject matter, instructional organization and approaches, and the use of teaching tools and resources, are referred to as teaching methods. The methodology is very important and crucial in any teaching-learning process, according to Ameh and Dantani (2012). The methodology chosen by the teacher can help or hurt the learning process. Science teachers in secondary schools use a variety of instructional methodologies to teach science-related subjects. Peer tutoring and class demonstration are notable examples of teaching techniques employed by secondary school teachers.

The group learning strategy is defined as the process of achieving group objectives through the exchange of ideas and resources among group members. This entails distributing the group's tasks and rewards to each participant. The beauty of a successful learning environment is that it engages students as active participants in the learning process, allowing them to take charge of their education while also promoting improvement in students' learning, developing the proper mindset, and building cognitive theoretical foundations. Through active brainstorming and information gathering, the group learning strategy encourages students to reach conclusions about a problem, with each group member

reflecting on the ability, background, and gender of the class as a whole (Dajal, Ogar, & Sunday, 2019).

In a group learning technique, teachers divide their students into smaller groups to help and support one another as they acquire academic material, become proficient learners, and accomplish a common objective. To encourage and assist mastery and knowledge of the subject matter, this learning technique offers platforms and chances for each member of the group to engage in teamwork in a spirit of cooperation and collaborative effort (Seweje & Olojo, 2011b). The instructor creates learning activities and social connections, facilitates the learning environment, and organizes work teams. In a teaching/learning setting, the students are in charge and accountable for both themselves and other group members. Therefore, what one student accomplishes becomes what aids and encourages another student to succeed (Kingdom-Aaron, Etokeren & Okwelle, 2019). Students are inspired to draw on and contribute from their own experiences to produce a common outcome. Students who participate in group learning have the opportunity to establish ideas, alter those ideas as they respond to group questions and share their insights, admit their doubts and weaknesses, and jointly create and carry out strategies to meet their objectives and improve their academic performance.

Academic success is a reflection of a student's comprehension of various ideas and abilities acquired in various areas. Parents often want their children to do highly in school across the majority of the world, which puts a lot of pressure on students, instructors, schools, and the entire educational system as a whole. Because student academic accomplishment is the centre of the entire educational system, schools devote a lot of time to assisting students in achieving excellent grades. According to Singh, Malik & Singh (2016), student academic success has a direct bearing on a nation's socioeconomic progress. Numerous variables, including IQ, study habits, student attitudes, learning and teaching strategies, socioeconomic status, motivation, and opportunity, among others, may have an impact on academic accomplishment. Academic success is regarded as a fundamental criterion to assess pupils' overall potential and learning capacities. Thus, academic success plays a crucial role in both the educational system and the learning process. This idea of academic accomplishment has given rise to concerns, particularly in light of the deteriorating educational standards (Nnamani, Dikko, & Kinta, 2014). This is true because academic achievement—or the degree to which a student or teacher has met their educational objectives—is the primary result of education.

According to Hijazi & Al-Natour (2012), science teachers' use of ineffective teaching and instructional practices has contributed to students' persistently poor performance in science classes. Numerous studies on the shockingly poor performance of secondary school students in the sciences have pointed to the continued use of the traditional method of instruction as one of the main problems with its learning and the reason for the subjects' extremely low achievement levels. The Chief WAEC Examiner Report (2014) indicated that students' poor performance in the sciences may be due to the pressure to finish all the topics. Researchers have found that one of the most important factors influencing students' academic success is the calibre of the teaching strategies employed by secondary school science teachers. In light of the aforementioned, this study investigated the impact of a group learning technique on students' academic performance in scientific classes.

2. Purpose of the Study

This study's main goal is to find out how group learning strategies affect students' academic performance in science classes. The study specifically intends to:

1. Identifying the academic achievement gap between students who were taught scientific concepts utilizing a group learning strategy and those who were taught using a conventional teaching approach.
2. Comparing the academic performance of male students who were taught scientific topics utilizing a group learning technique and their counterparts who were taught the same concepts using conventional teaching approaches.
3. Identifying the academic achievement gap between female students who were taught scientific concepts using a group learning strategy and those who were taught using a conventional teaching approach.
4. Determining the academic achievement gap between male and female students in Senior

Secondary Schools who were taught science-related subjects utilizing group learning technique.

3. Research Questions

This study was guided by the following research questions:

1. How do students who were taught scientific concepts utilizing a group learning strategy compare academically to those taught using a traditional teaching approach?
2. How do male students who learnt scientific concepts in a group setting compare to those who learn them in the conventional setting; in terms of academic achievement?
3. How do female students who are taught scientific topics through the group learning strategy do academically compared to those who are taught through the traditional teaching strategy?
4. In Senior Secondary Schools, how do male and female students perform differently when studying scientific concepts in a group setting?

4. Hypotheses

In this study, the following hypotheses were developed and investigated:

- HO1: The academic performance of students taught scientific concepts using group learning approach and those taught using traditional teaching techniques do not significantly differ.
- HO2: The academic achievement of male students who were taught scientific topics utilizing a group learning strategy and those who were taught using a traditional teaching method did not differ significantly.
- HO3: The academic performance of female students taught scientific concepts using group learning approach and those taught using traditional teaching methods does not significantly differ.
- HO4: In Senior Secondary Schools, there is no appreciable difference in the academic of male and female students who are taught scientific concepts through group learning strategies.

5. Literature Review

Two generally acknowledged learning tenets are that students build their own knowledge and that learning is fundamentally a social process. Group learning is supported by both tenets. Working in small groups gives students the chance to express their thoughts and understandings, dispel misunderstandings and presumptions, and bargain with others to produce something or come to an agreement. Students can learn more about the subject matter and develop their thinking skills through group activities, according to the University of Illinois Board of Trustees (UIBT), 202. The best group projects involve students in higher-level material that is challenging to comprehend, open to numerous interpretations, or both. One teaching strategy that might assist students in learning academic information and social skills is cooperative learning, often known as small-group learning. You may foster a pleasant social environment in your classroom by studying more about cooperative learning (Indeed Editorial Team, 2022).

Working in small groups gives students the chance to express their thoughts and understandings, dispel misunderstandings and presumptions, and bargain with others to produce something or come to an agreement. Group activities, according to Gautam (2018), help students understand the topic more deeply and develop their thinking abilities. Student-centered group learning is how it varies from the conventional, teacher-centered classroom. In a conventional classroom, the instructor serves as the students "learning disseminator," providing them with all the knowledge they require. However, in a classroom with other students, the teacher adopts the position of "learning facilitator," guiding the students in selecting the resources they will need to finish the work at hand (Annenberg Foundation, 2022). Students are encouraged to build a variety of interpersonal, intrapersonal, presentational, and communicational skills through group learning, all of which are useful in the real world. These crucial skills are challenging to develop on an individual level and require constant feedback and engagement with group members, which is impossible if the group dynamic is not utilized (Gautam, 2018).

The success of cooperative learning has been the subject of numerous researches. For instance, Kingdom-Aaron, Etokeren & Okwelle (2019) looked into how students' academic performance in biology at senior secondary schools in Rivers State was affected by cooperative learning strategies. They found that students taught biology using a cooperative learning strategy performed significantly better than those taught using a traditional lecture method. They found that students in the experimental group who used a cooperative learning teaching style performed much better on a biology performance test than students in the group who used the traditional method. They discovered no discernible differences in the performance of pupils who were taught biological concepts through cooperative learning methodologies based on gender (male and female) or school type (public or private). They came to the conclusion that the cooperative learning technique is superior to the traditional lecture method for teaching and improves the performance of biology students.

Ugwuadu & Abdullahi (2012) did a similar study on the impact of cooperative learning strategies among biology students in Adamawa State's Yola educational zone. The study's findings showed that, in both unisex and mixed schools, the cooperative learning technique improved students' academic performance in Biology. Between the mean achievement scores of the experimental and control groups, they discovered a substantial difference favoring the experimental group. The researchers recommended among other things, implementing a cooperative learning technique in biology teaching and learning in schools. In addition, Omeodu (2019) researched into how students' academic performance in the physics course Elasticity in the Obio-Akpor Local Government Area of Rivers State was affected by the cooperative learning technique. The study discovered that the cooperative learning approach improves active student interaction and participation. This trait has a substantial educational impact on physics. In order to increase active student participation in scientific operation, it was suggested that science teachers be urged to employ cooperative teaching strategies.

A study on the effects of cooperative learning strategies on the performance of senior secondary school physics students in Jos South, Plateau State, was conducted by Ayatse, Madu & Emenna (2021). The results showed that the cooperative learning group students outperformed the traditional classroom learning group students, and that there was also a negligible performance difference between the male and female cooperative learning group students. Based on the results, it was suggested that all secondary school physics teachers implement the cooperative learning technique as an efficient teaching method to raise students' performance in physics. Similar to this, Seweje, & Olojo, 2011b) examined the impact of cooperative, competitive, and individualistic teaching strategies on the learning outcomes in mathematics for senior secondary students and discovered that cooperative strategy performed the best among the treatment groups. Additionally, the results demonstrated that cooperative learning strategies improved students' performance on learning tasks and encouraged and promoted a positive attitude toward understanding mathematical ideas.

6. Methodology

To examine the relationship between the variables, the study employed a quasi-experimental research design. The non-randomized pre-test, post-test control group design was used as the study's quasi-experimental structure, and it is shown diagrammatically below:

Experimental Group: O1 X1 O2
Control Group: O3 X2 O4

Where O1, O3, = observation (Pretest)

O2, O4, = observation (Posttest)

X1 – Treatment (Group learning strategy)

X2- treatment (Conventional Method)

Academic accomplishment is the dependent variable, while one mode of instruction was one of the independent factors. The study was carried out in Ikere Local Government Area of Ekiti State's public Senior Secondary Schools. All of the study's participating schools were located in the Ikere Ekiti Local Government Area. Therefore, the entire public Secondary School Science Two (SSS 2) student body in Ikere Ekiti Local Government Area of Ekiti State was the target population.

The study sample consisted of a total of 120 individuals from senior secondary school 2 (SSS 2) intact classes. This group consists of forty (40) respondents who were taught the same concepts

using the traditional teaching technique in the control group, and eighty (80) respondents who were taught the concepts using a group learning strategy. Using a deliberate selection method, six schools were selected for the study. This approach was utilized to guarantee that co-educational public schools were chosen for the study. Four schools were assigned to the experimental group and two to the control group using a simple random sampling procedure. Co-educational schools were chosen so that the researchers could collect data for the study based on the gender of the students. The study's instrument was the Science Achievement Test (SAT), which the researcher constructed to collect data from the participants. The same tool was used to collect data for both the pre-test and post-test. The objective 50-item SAT measured a student's intellectual understanding, application, and knowledge of common scientific topics. A total of 100 points were awarded for the exam. 50 different items received these ratings. Each answer scored two points.

6.1 Validity and Reliability of the Instrument

50 objective test questions on the SAT had five possible responses, ranging from A to E. Face and content validity methodologies were used to evaluate the instrument's validity. This was achieved by making sure the test items were well-written and covered the topics covered during the instruction. The examination questions were adapted from earlier ones from the National Examination Council (NECO) and the West African Examination Council (WAEC). The fact that the questions were altered versions of common examination questions led to the conclusion that they were reliable.

6.2 Contents of the Study

The SSS2 curriculum was used to select the topics for the research. Osmosis and diffusion, cell division, plant and animal cells, alkanos, the periodic table, the concept of position and distance in coordinate systems, vectors, and uniformly accelerated motion were all specifically covered in the course material. These topics required a significant amount of the science process skills that are expected of senior high school science students.

6.3 Instructional Package

The study's instructional materials were produced by the researchers. It was composed of lesson plans on scientific concepts included in the study's contents. These lesson plans were created for both the experimental and control groups' students. The lesson plans for both the traditional and group teaching strategies were found to be adequate in terms of scope and content based on the selected topics by science subject specialists from the College of Education at the Bamidele Olumilua University of Education, Science, and Technology, Ikere, Ekiti, as well as highly skilled senior secondary school science teachers who are also skilled WAEC and NECO examiners in the three major science subjects.

6.4 Experimental Procedure

The researchers conducted the instruction with the aid of study assistants who were the classroom teachers in the schools included in the sample. After receiving the necessary instruction on how to use the teaching methods, the research assistants gave the pre-test to both the control and experimental groups. The experimental group and the control group both received instruction on the same topics. The pretest was given before the participants were instructed to utilize any teaching pedagogy at the start of the procedure. The objective was to locate their entrance. During the six-week teaching period, both the group teaching method and the traditional instructional strategy were employed. Both groups received the posttest immediately after the therapy by the researchers. The pre-test and post-test were then requested by the researchers for examination.

6.5 Method of Data Analysis

The data were analyzed using the SPSS version 23 application, which stands for Statistical Package for Social Sciences. The outcomes from the pre-test and post-test for the experimental groups were compared in terms of mean scores and standard deviation. A paired sample t-test with a coefficient alpha level of 0.05 was used to evaluate whether there was a significant difference between the science class before and after the implementation of the group teaching technique.

7. Results and Discussion

The goal of the study was to examine how the group learning technique affected the academic performance of senior secondary school science students in the Ikere Local Government Area of the state of Ekiti. The four (4) proposed research questions were addressed descriptively, and the four (4)

proposed study hypotheses were tested at the 0.05 level of significance and assessed using the appropriate inferential statistic.

7.1 Descriptive Analysis

Research Question 1: How do students who were taught scientific concepts utilizing group learning strategy compare academically to those taught using a traditional teaching approach?

Table 1: Responses to the difference between the academic achievement of students taught scientific concepts using group learning strategy and those taught using conventional teaching method

Method	No (%)	Mean	SD
Group learning strategy	80 (66.7)	19.31	3.479
Conventional Method	40 (33.3)	12.06	3.148

The mean achievement scores of students who were taught science topics utilizing a group learning strategy and conventional methods were shown in Table 1 together with their standard deviation. It demonstrates that the mean and standard deviation of the scores of the students taught utilizing the group learning technique are (19.31) and (3.479), respectively. Additionally, the standard deviation of students taught using the conventional technique is 3.148 and the mean score is 12.06. This demonstrated unequivocally that the mean difference between the two groups was 7.25. This suggests that learners in the conventional group performed worse academically on average than those in the experimental group. As a result, there was a difference in academic accomplishment between students who learned scientific concepts through group learning and those who learned the same concepts through traditional teaching methods, favouring those who learned through group learning.

Research Question 2: How do male students who learnt scientific concepts in a group setting compare to those who learn them in the conventional setting; in terms of academic achievement?

Table 2 Responses to the difference in the academic achievement of male students taught scientific concepts using group learning strategy and those taught using conventional teaching method

Method (Gender)	No (%)	Mean	SD
Group learning strategy (Male)	40 (66.7)	18.10	5.315
Conventional Method (Male)	20 (33.3)	17.38	6.618

The mean achievement scores of male students who were taught scientific subjects utilizing a group learning strategy and conventional methods were shown in Table 2 along with their standard deviation. The table demonstrates the mean (18.10) and standard deviation (5.315) of the scores of male students who were taught using a group learning technique. Additionally, the mean achievement score for male students who were taught using the usual technique was 17.38, and the standard deviation was 6.61. This confirmed unequivocally that (0.72) was the mean difference between the two groups. This suggests that male students in the conventional group performed on average less well than male students in the experimental group did on average. As a result, male students who were taught utilizing a group learning strategy had higher accomplishments than those who were taught using a traditional manner.

Research Question 3: How do female students who are taught scientific topics through group learning strategy do academically compared to those who are taught through the traditional teaching strategy?

Table 3: Responses to the difference in the academic achievement of female students taught scientific concepts using group learning strategy and those taught using conventional teaching method

Method (Gender)	No (%)	Mean	SD
Group learning strategy (Female)	40 (66.7)	20.11	8.221

Conventional Method (Female)	20 (33.3)	18.74	6.789
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The mean achievement scores of female students who were taught concepts in science utilizing a group learning technique and conventional methods were shown in Table 3 together with their standard deviation. The table showed that the mean and standard deviation of the scores of female students who were instructed utilizing a group learning technique were both 20.11 and 8.221, respectively. Additionally, the mean and standard deviation of the achievement score for female students using the traditional learning approach are both 18.74 and 6.78, respectively. This demonstrated that there was a mean difference of 1.37 between the two groups. This suggests that the average performance of female students in the conventional group was comparable to the average mean performance of female students in the experimental group in terms of academic attainment. As a result, female students who were taught utilizing a group learning strategy performed better than those who were taught using a traditional manner.

Research Question 4: In Senior Secondary Schools, how do male and female students perform differently when studying scientific concepts in a group setting?

Table 4: Responses to the difference between the performance of male and female students taught scientific concepts using group learning strategy

Gender	No (%)	Mean	SD
Male	40 (50.0)	18.10	5.315
Female	40 (50.0)	18.74	6.789

The mean achievement scores of male and female students who were taught science concepts using a group learning technique were shown in Table 4 along with their standard deviations. The table displayed a mean score of 18.10 and a standard deviation of (5.315) for male students who were taught using a group learning technique. Additionally, female students who were taught utilizing the group learning technique had achievement scores with a mean of (18.74) and a standard deviation of (6.789). This demonstrated that there was a mean difference of (0.64) between the two groups. As a result, it can be concluded that the average mean achievement of male students in the experimental group was slightly lower than that of female students. As a result, there is a difference in how well male and female students perform when acquiring scientific concepts in a group setting, favouring female students.

7.2 Testing of Hypotheses

Hypothesis 1: The academic performance of students taught scientific concepts using group learning approach and those taught using traditional teaching technique does not significantly differ.

Table 5 t-test analysis of difference between the academic achievement of students taught scientific concepts using group learning strategy and those taught using conventional teaching method

Method	N	Mean	SD	Df	t_(cal)	t_(tab)	Decision
Group learning strategy	80	19.31	3.479				
				118	4.332	1.98	S
Conventional Strategy	40	12.06	3.148				

P < 0.05 level of significance

S = Significant

Table 5 shows that there is a mean difference of 7.25 between the mean scores of respondents who were taught scientific topics using the group learning strategy (19.31) and those who were taught the same concepts using the conventional way (12.06). There is a difference of (0.331) in the standard deviation, a measure of variability. At the 0.05 level of significance, the t-test analysis reveals that the calculated value (4.332) is greater than the table value (1.98). This suggests that there is a considerable gap between the academic results of students taught scientific concepts utilizing group learning strategies and those taught using traditional teaching methods, with the former having a higher mean score. Therefore, the null hypothesis cannot be supported.

Hypothesis 2: The academic achievement of male students who were taught scientific topics utilizing a group learning strategy and those who were taught using a traditional teaching method did not differ significantly.

Table 6: *t-test analysis of difference in the academic achievement of male students taught scientific concepts using group learning strategy and those taught using conventional teaching method*

Method (Gender)		No	Mean	SD	Df	t _(cal)	t _(tab)	Decision
Group learning strategy (Male)		40	18.10	5.315				
					58	0.655	1.98	NS
Conventional Method (Male)		20	17.38	6.618				

P < 0.05 level of significance

NS = Not Significant

According to Table 6, the mean score of the male respondents who were taught scientific concepts using a group learning technique was 18.10, which is just 0.72 points higher than the mean score of the male respondents who were taught using a traditional method, which was 17.38. There is a difference of (1.33) in the standard deviation, which is a measure of variability. The t-test analysis demonstrates that, at the 0.05 level of significance, the calculated value (0.655) is less than the table value (1.98). This means that there is no discernible difference between male students who were taught scientific topics using a group learning technique and those who were taught using a traditional teaching method in terms of their academic accomplishments. The null hypothesis is therefore supported.

Hypothesis 3: The academic performance of female students taught scientific concepts using group learning approach and those taught using traditional teaching methods does not significantly differ.

Table 7: *t-test analysis of the difference in the academic achievement of female students taught scientific concepts using group learning strategy and those taught using conventional teaching method*

Method (Gender)		N	Mean	SD	Df	t _(cal)	t _(tab)	Decision
Group learning strategy (Female)		40	20.11	8.221				
					58	3.075	1.98	S
Conventional (Female)		20	18.74	6.789				

P < 0.05 level of significance

S = Significant

Table 7 shows that there is a mean difference of 1.37 between the mean scores of the female respondents who were taught scientific concepts using the group learning technique (20.11) and those of the female respondents who were taught the same concepts using the conventional method (18.74). There is a discrepancy of (1.432) in the standard deviation, a measure of variability. The estimated result (3.075) is greater than the table value (1.98) at the 0.05 level of significance, according to the t-test analysis. This suggests that the mean scores of female science students taught utilizing the group learning strategy and conventional methods differ significantly. Female students who were taught using the group learning strategy outperformed their counterparts in the conventional group because they had a higher mean score rating than those who were taught using the traditional way. Therefore, the null hypothesis cannot be supported. This suggests that the academic accomplishment of female students taught scientific concepts utilizing group learning techniques and those taught using the usual teaching method differed significantly, in favour of the group learning strategy.

Hypothesis 4: In Senior Secondary Schools, there is no appreciable difference in the academic of male and female students who are taught scientific concepts through group learning strategies.

Table 8: *t-test analysis of difference between the performance of male and female students taught scientific concepts using group learning strategy*

Gender	N	Mean	SD	Df	t _(cal)	t _(tab)	Decision
Male	40	18.10	5.315	78	4.017	1.98	S
Female	40	18.74	6.789				

P < 0.05 level of significance

S = Significant

According to Table 8, there is a mean difference of (0.64) between the mean accomplishment scores of the male respondents (18.10) and the mean achievement scores of the female respondents (18.74). There is a difference of (1.474) in the standard deviation, a measure of variability. The t-test analysis demonstrates that, at the 0.05 level of significance, the calculated value (4.017) is greater than the table value (1.98). This suggests that there are noticeable differences in how well male and female students do when acquiring scientific concepts in a group learning setting. The greater mean achievement for female students suggests that they fared better than their male counterparts when exposed to group learning strategies. Therefore, the null hypothesis cannot be supported.

7.3 Discussion of Findings

The study's descriptive analysis revealed that there was a difference between students who learned scientific concepts through group learning and those who learned the same concepts using traditional teaching methods, favouring those who learned through group learning. The study also showed that male students in the conventional group performed on average less well than male students in the experimental group did on average. As a result, male students who were taught utilizing a group learning strategy had higher accomplishments than those who were taught using a traditional manner.

The average performance of female students in the conventional group was further discovered to be on par with the average mean performance of female students in the experimental group. As a result, female students who were taught utilizing a group learning strategy performed better than those who were taught using a traditional manner. The study's descriptive analysis also revealed that the average mean achievement of male students in the experimental group was slightly lower than that of female students in the same group. As a result, there is a difference in how well male and female students perform when acquiring scientific concepts in a group setting, favouring female students.

According to the study's inferential analysis, students who learned scientific concepts through group learning strategies had significantly higher mean scores than students who learned them through traditional teaching methods. This supported the claims made by the Indeed Editorial Team (2022) and Seweje, & Olojo, (2011b) that cooperative learning, also known as small-group learning, is a teaching strategy that can aid students in learning academic content and social skills, as well as in understanding more and fostering positive social experiences in the classroom. Additionally, the claim made by Gautam (2018), who claimed that group learning assists students to uncover deeper meaning in the course materials and develop thinking abilities, confirmed the study's findings. He went on to say that group learning allows students to develop a variety of communication, presentation, and interpersonal skills that are all useful in life outside of the classroom. These crucial abilities are challenging to develop on an individual level and call for constant feedback and engagement with the group members, which cannot be accomplished by utilizing the group's advantages (Gautam, 2018).

It was also shown that there is no discernible difference between male students who were taught scientific topics using a group learning technique and those who were taught using a traditional teaching method in terms of their academic accomplishment. The academic accomplishment of female students who were taught scientific concepts utilizing a group learning technique and those who were taught using a traditional teaching method differed significantly, it was further discovered.

Last but not least, the study's inferential analysis showed that male and female students who were taught scientific concepts using a group learning technique performed very differently from one another. The greater mean achievement for female students suggests that they fared better than their male counterparts when exposed to group learning strategies.

This result is consistent with those of Ayatse, Madu & Emenna (2021), who discovered that the cooperative learning group students performed better than the students in the traditional classroom learning group and that there was also a negligible performance difference between the male and female cooperative learning group students. The findings of Omeodu (2019), Kingdom - Aaron, Etokreem & Okwelle (2019), Ugwada & Abdullahi (2012), and Seweje, R.O. & Olojo, O.J. (2011b) that cooperative learning was the most effective method for teaching Biology, Physics, and Mathematics were also supported by this outcome. This finding, however, conflicts with that of Akaneme & Ngwoke (2010), who believed that effective teaching strategies can favour both boys and

girls equally without exhibiting any gender bias. Additionally, according to Ezeobi (2017) and Obialor (2016), gender had no substantial impact on student's performance in science. Similar to this, Nwabueze (2006) discovered no appreciable differences between the mean achievement scores of male and female students who were taught quadratic equations using the tile approach.

8. Conclusion

According to the study's findings, students who participated in group learning strategies did noticeably better than their counterparts who participated in conventional methods. The study also found that there were notable differences in gender achievement depending on the instructional approach used in the experimental group. While there was a significant difference between the performance of female students in the experimental and control groups, there was not a significant difference between the performance of male students in the experimental and control groups when they were taught sciences using group learning strategy and conventional method, and female students outperformed their male counterparts when exposed to group learning strategy.

9. Recommendation

To increase the academic performance of science students, it is recommended that group learning strategy teaching methods be implemented in the instruction of all scientific and mathematics disciplines at the secondary school. Additionally, for effective lesson delivery in secondary schools, teachers should be encouraged to design their lessons to provide equal learning opportunities to both male and female students. Additionally, all types of teachers should attend seminars on the utilization of group learning methodologies.

Similarly to this, for better student achievement, science teachers should emphasize the usage of group learning techniques when teaching and learning the subjects.

Finally, the establishment of resource centres by the government at all levels and other professional organizations, such as the Science Teachers Association, would help teachers and other stakeholders in the education sector learn more about the effectiveness of the group learning strategy in the teaching of scientific concepts.

References

- Adekunle, D. (2019). *Education in the Modern Africa Settings*; New Press Nigeria, Ibadan.
- Akaneme, I. M. & Ngwoke, D. U. (2010). Effect of Cognitive and Restructuring Intervention Programme on Achievement Orientation of Schooling Adolescent. *Journal of the Nigerian Academy of Education*, 6(11), 1 – 11.
- Ameh, P. O., & Dantani, Y. S. (2012). Effects of Lecture and Demonstration Methods on the Academic Achievement of Students in Chemistry in Nassarawa Local Government Area of Kano State. *International Journal of Modern Social Sciences*, 1(1), 29-37.
- Annenberg Foundation, (2022). *Teaching Strategies: Cooperative Learning*, <https://www.learner.org/series/insights-into-algebra-1-teaching-for-learning-2/variables-and-patterns-of-change/teaching-strategies-cooperative-learning>.
- Ayatse, H. I., Madu, O. V., & Emenna, C. I. (2021). Effects of Cooperative Learning Strategy on the Achievement of Senior Secondary School Physics Students in Jos South, Plateau State, *International Journal of Science and Applied Research*, 4(1&2), 1 – 13.
- Dajal, R. G., Ogar, S. I., & Sunday, E. T. (2019). Effect of Learning Together Strategy on Secondary School Students' Achievement in Biology In Abaji Area Council, Federal Capital Territory Abuja, Nigeria, *UNIZIK Journal of Educational Management and Policy*, 3 (1), 108 – 116.
- Ezeobi, G. O. (2017). Effects of Practical Work on Senior Secondary School Students Achievement in Biology in Awka Education Zone of Anambra, *OWSDSEFIJOSAT*, 2 (1), 149. from <http://www.basearticles.com/Art/932483/39>.
- Gautam, N. (2018). Importance of Group Learning and its Approaches in Teacher Education, *Journal of Emerging Technologies and Innovative Research (JETIR)*, 5(4), 1 – 7.
- Hijazi, D., & Al-natour, A. (2012). The Impact of Using Music on Science Subject In Jordanian Universities. *Journal of International Education Research (JIER)*, 8(3), 295–302.

- Ihejiamaizu, C. C., Neji, H. A., & Agiande, I. U. (2020). Effect of Cooperative Learning Strategy on Senior Secondary School Students' Academic Performance in Biology in Cross River State, Nigeria, *European Journal of Scientific Research*, 156(2), 138 – 144.
- Indeed Editorial Team, (2022). *Cooperative Learning Strategies: Definition, Benefits and Tips*, <https://www.indeed.com/career-advice/career-development/cooperative-learning-strategies>.
Journal of the Institute of Education, Lagos state University, 1, 1-6.
- Kenni, A. M. (2020). Effect of Class Size on Academic Achievement of Chemistry Students in Ikere Local Government Area of Ekiti State, Nigeria, *International Journal of Social Science and Humanities Research*, 3(9), 1 – 18.
- Kingdom-Aaron, G. I., Etokeren, S., & Okwelle, C. (2019). Effect of cooperative learning strategy on biology students' academic performance in senior secondary school in rivers state. *Journal of Scientific Research and Reports*, 23(6), 1-11.
- Nnamani, C., Dikko, H., & Kinta, L. (2014). Impact of students' financial strength on their academic performance: Kaduna polytechnic experience. *African Research Review*, 8(1), 83.
- Nwabueze, M.C. (2009). *Effects of Area Tiles Approach on Students Achievement and Interest in Quadratic Equation in Senior Secondary School Level*. Unpublished M.Ed. Thesis, Department of Science Education, University of Nigeria, Nsukka.
- Obialor, C. O. (2016). *Effect of Project Work on Students' Science Process Skills Acquisition and Achievement in Secondary School Biology*. Master's Thesis, Department of Science Education, Nnamdi Azikiwe University, Awka.
- Oghenevwe, O. E. (2019). Enhancing Biology Students' Academic Achievement and Attitude Through Self-Regulated Learning Strategy in Senior Secondary Schools in Delta Central Senatorial District, *Journal of Educational and Social Research*, 9(4), 149 – 156.
- Okebukola, P.A.O.(2019). Curriculum implementation in Nigeria. Strategies For the 21st century.
- Omoedu, M. D. (2019). Effects of Cooperative Learning Strategy on Students' academic Achievement In Elasticity In Obio-Akpor Local Government Area Rivers State, *Global Scientific Journal*, 7(8), 1 – 13.
- Omoeswo, E.O. (2022). Views of Physics teachers on the need to train and retrain Physics teachers in Nigeria. *African Research Review*, 3 (1), 314-325.
- Precious Ugwuzor (2023). Harnessing Nigeria's Science, Technology and Innovation Potential.
- Seweje, R.O. & Olojo, O.J. (2011b): Effects of Cooperative, Competitive and Individualistic Instructional Strategies on students' achievement in mathematics. *Nigerian Journal of Educational Research and Evaluation (NAERE)*, 10(3), 215 – 224.
- Singh, S. P., Malik, S., & Singh, P. (2016). Factors Affecting Academic Performance of Students. *Indian Journal of Research*, 5(4), 176-178.
- This Day Newspaper, Thursday, June 22, 2023.
- Ugwuadu, O. R., & Abdullahi, S. (2012). Effect of Cooperative Learning Strategy on Biology Students' Academic Achievement in Yola Educational Zone of Adamawa State, *Knowledge Review Volume*, 24 (1), 1 – 8.
- University of Illinois Board of Trustees, (2022). *Teaching & Learning*, [tps://citl.illinois.edu/citl-101/teaching-learning/resources/teaching-strategies/group-learning](https://citl.illinois.edu/citl-101/teaching-learning/resources/teaching-strategies/group-learning).
- WASSCE Chief Examiner's Reports, (2014). *Report on Students performance in Biology*, WASSCE.