

Effects of Team Teaching Strategy on Junior Secondary School Students' Performance in Basic Science in Ekiti State, Nigeria

AUTHOR(S): OKEYA, Abiodun Emmanuel (Ph.D),
ADEDEJI, Florence Taiwo (Ph.D), ABIDAKUN, Ojo Titus (Ph.D)

Abstract

The study examined the effects of Team Teaching Strategy on Junior Secondary School Students' Performance in Basic Science in Ekiti State, Nigeria. Specifically, the study was designed to ascertain the difference in the pre-test and post-test mean scores of students exposed to team teaching strategy and conventional method. This study adopted a pre-test and post-test two group quasi experimental design (one experimental group and one control group). The population of the study comprised 21,677 junior secondary three students in 205 public secondary schools in Ekiti State. The sample consisted of 163 students in intact classes drawn from four public secondary schools in one senatorial district from the three senatorial districts in Ekiti State. The sample was selected using multistage sampling procedure. The instrument used for the study was Performance Test in Basic Science (PTBS). The face and content validity of the instrument was ensured using the judgement by experts of Tests and Measurement, Science Education and the researcher's supervisor. The reliability of the instrument was established using Cronbach Alpha which yielded reliability coefficient value of 0.73 for PTBS. The data collected for this study were analysed using descriptive and inferential statistics. The research questions were answered using means, standard deviation and bar chart. All Hypotheses were tested using t-test, Analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA). All hypotheses were tested at 0.05 level of significance. The findings of the study showed that the two groups (Team Teaching and Conventional) were homogenous at the commencement of the experiment. The use of Team Teaching Strategy enhanced better

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performance of students in Basic Science than the conventional method. It was also recommended that the Ministry of Education should offer professional training and re-training to Basic Science teachers through workshops and seminars to enhance their skills in team teaching and collaborative pedagogical practices.

Keywords: Team Teaching, Basic Science, Students' Performance,



About Author

Author(s):

OKEYA, Abiodun Emmanuel (Ph.D)

Department of Science Education, School of Science Education,
College of Education,
Bamidele Olumilua University of Education, Science and Technology
Ikere – Ekiti, Ekiti State, Nigeria.
okeya.abiodun@bouesti.edu.ng

ADEDEJI, Florence Taiwo (Ph.D)

Department of Science Education, Faculty of Education,
Ekiti State University, Ado - Ekiti.
adedejifloxyt@gmail.com

ABIDAKUN, Ojo Titus (Ph.D)

Department of Science Education, Faculty of Education,
Ekiti State University, Ado - Ekiti.
titusabidakunoludare@gmail.com



Introduction

Science is a systematized knowledge and a process of inquiry that is geared towards understanding nature in order to improve the living standard of man. The primary focus of science is to collect data and the ultimate purpose is to discern order that exists in natural phenomena and happenings around us. Countries all over the world are striving to improve their technological know-how and this can only be achieved through a solid foundation in science and technology. Having a solid foundation in sciences entails making students having keen interest in Basic Science right from their junior secondary school level of education.

At the junior secondary school level, Integrated Science now known as basic science was introduced for the purpose of giving foundation skills and knowledge for subsequent science studies at the higher level. The acquisition of appropriate skills and the development of mental, physical and social abilities and competencies for the individual to live in and contribute to the development of the society in which he lives, has been a major concern of Basic Science. The subject views nature in a holistic approach and this makes it a discipline in its own right. The above definitions show that science is not just a collection of data and facts neither is it an assembly of sterile body of knowledge but it involves engaging in certain activities as well (Okeya & Owolabi, 2020).

Basic Science describes the most basic objects, forces, relationship between them and laws governing them, such that all other phenomena may be derived from them following the logic of scientific reductionism. The study of Basic Science leads to technological advancement and economic benefits that offer unique opportunities to meet the basic human needs, reduce poverty, protect the environment and improve the quality of life. Basic Science is the platform for knowledge base development (Okeya & Owolabi, 2020). Basic Science concepts are generally geared towards technological development and appropriate strategy for the acquisition of relevant skills needed for meaningful learning of science concepts.

Alternating teaching techniques can be a means of effective teaching and learning process. Over the years, the focus on higher education research has shifted from an understanding of the teacher as the omniscient authority who transmits knowledge to passive recipients to a more inclusive appreciation of students as knowledge constructors and the need for teachers to act as facilitators in that process (Biggs, 2019).

Team teaching can be defined as a group of two or more teachers working together to plan, conduct and evaluate learning activities for the same group of learners. Team teaching can therefore be viewed, as team work between two or more qualified instructors who together make presentations to an audience (the learners). Team teaching involves a group of instructors working purposefully, regularly, and cooperatively to help a group of students of any age learn. Teachers set goals together for a course, design a syllabus, prepare individual lesson plans, teach students, and evaluate the results of the teaching and learning process. In other words, team teaching according to Nkechi, Lilian and Ngozy, (2015) brings together two or more colleagues working together, but sometimes also working with professional and/or administrative colleagues - to plan, conduct and evaluate the unit of study, including assessment, for the same group of students.

The use of innovative teaching strategy like team teaching during the teaching and learning process of Basic Science may affect students' attitude towards the subject. Jegede and Daramola (2013) opined that appropriate learning strategies employed by the teacher must

depend on learners' interest and attitude which can invariably increase and enhance enrolment in science at the upper basic class.

The study examined the effects of team teaching strategy on junior secondary school students' performance in Basic Science in Ekiti State, Nigeria. The study specifically examined:

1. There is no significant difference in the pre-test mean scores of students exposed to team teaching strategy and conventional method.
2. There is no significant difference in the post-test mean scores of students exposed to team teaching strategy and conventional method.
3. There is no significant difference in the pre-test and post-test mean scores of students exposed to team teaching strategy.

Research Question

The following research question was raised to guide the study:

1. What is the performance of students in Basic Science before and after treatment?

Research Hypotheses

The following null hypotheses were postulated for this study.

1. There is no significant difference in the pre-test mean scores of students exposed to team teaching strategy and conventional method.
2. There is no significant difference in the post-test mean scores of students exposed to team teaching strategy and conventional method.
3. There is no significant difference in the pre-test and post-test mean scores of students exposed to team teaching strategy.

Methodology

This study adopted a pre-test and post-test two group quasi experimental design (one experimental group and one control group). Pretest was used to establish the knowledge baseline of the students as well as the homogeneity of the two groups while post-test was used after the treatment to measure performance of students. The population of the study comprised 21,677 junior secondary three (JS III) students in 205 public secondary schools in Ekiti State. The sample consisted of 163 students in intact classes drawn from four public secondary schools in Ekiti State, Nigeria. The sample was selected using multistage sampling procedure. The first stage involved the selection of one senatorial district from the three senatorial districts in Ekiti State through simple random sampling technique. In stage two, two Local Government Areas (LGAs) were selected from the senatorial district using simple random sampling technique. In stage three, two public secondary schools were selected from each of the LGA through simple random sampling technique. In stage four, the J.S. III intact class size of each of the four schools were used for the study. Stratified sampling technique was used to group the schools into different experimental and control groups so that the two schools that were selected from each of the Local Government Areas would take care of one experimental group and a control group. A day workshop was organized for each of the research assistants who handled the team teaching strategy.

Research Instrument

Performance Test in Basic Science (PTBS) was used to measure performance of the students in Basic Science. It consisted of sections A and B, section A sought the bio-data of the respondents which included the name of school, local government area, class, group, identification number, sex, age. Section B of PTBS consisted of 40 multiple choice test items of five options (A - E) which made of twelve questions on knowledge, eight questions on

comprehension, eight questions on application, four questions on analysis, four questions on synthesis and four questions on Evaluation which covered Magnetism, Drug and substance Abuse, Environmental Hazards and Resources from Living and Non-Living Things. The items covered all the topics to be taught for the eight weeks. The PTBS was used for both pre-test and post-test for data collection. The pre-test was designed to test the homogeneity of the two groups. The options of contents of PTBS used for pre-test was reshuffled for the post-test in order to prevent carry-over effect. Correct answer to each of the question items was assigned '1' mark while wrong choice was assigned '0' mark.

The face and content validity of the instrument was ensured using the judgement by experts of Test and Measurement, Science Education and the researcher's supervisor. The validity determination was to assess the wordings and ambiguity of the test items and attitudinal scale as well as their coverage. The reliability of the instrument, PTBS was determined by finding the internal consistency of the instrument. In doing this, a pilot study was carried out outside the sampled schools. The instrument was administered on 20 respondents. The responses collected were analysed using Cronbach Alpha. A co-efficient value of 0.73 was obtained for PTBS. The co-efficient value obtained was considered statistically high to make the instrument reliable.

The data collected through the instrument were analyzed using descriptive and inferential statistics. The research question was answered using means, standard deviation and bar chart. Hypotheses 1 and 2 were tested using t-test, hypotheses 3 was tested using Analysis of Covariance (ANCOVA). All the hypotheses were tested at 0.05 level of significance.

Results

Research Question 1: What is the performance of students in Basic Science before and after treatment?

Table 1: Mean and standard deviation of pre-test and post-test scores of students exposed to team teaching strategy and conventional method

Strategies	Test	N	Mean	S.D	Mean Diff.
Team Teaching	Pre Test	79	13.19	2.14	18.67
	Post Test		31.86	2.58	
Conventional	Pre Test	84	13.11	2.03	6.86
	Post Test		19.97	1.76	
Total		163			

Table 1 shows the mean difference in students' performance in Basic Science between pre-test and post-test scores for team teaching strategy is 18.67 and conventional method is 6.86. The use of team teaching strategy and conventional method influences students' performance in Basic Science with team teaching strategy being the more effective method in the teaching of Basic Science. The graphical representation below further shows the more effective method in the teaching of Basic Science.

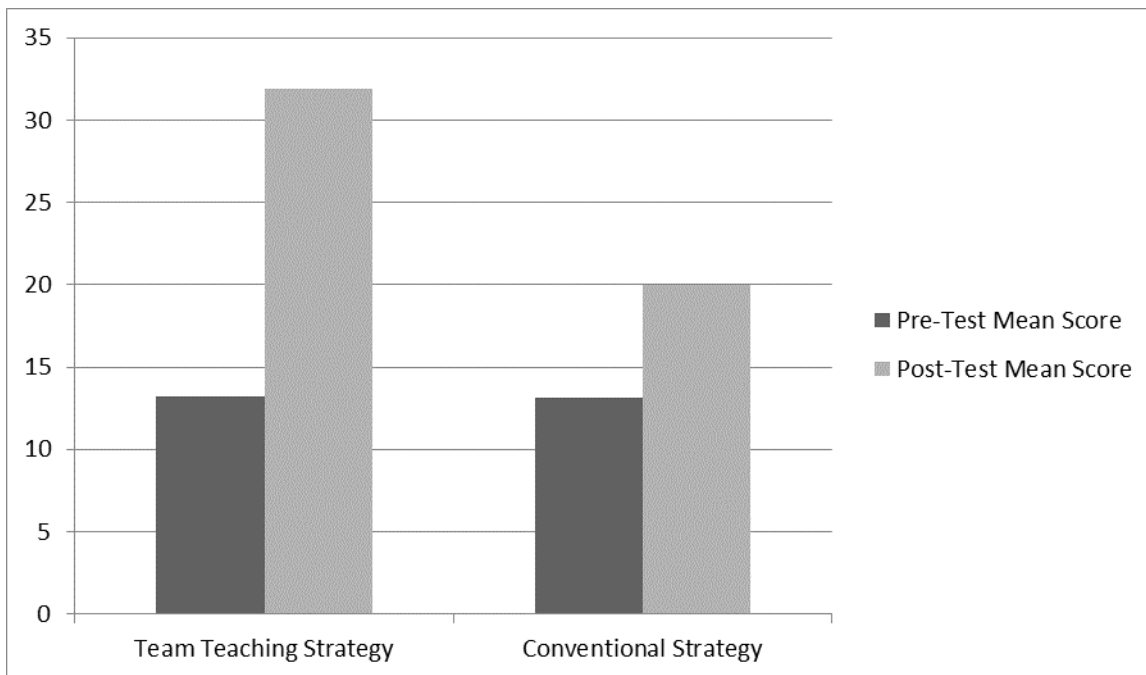


Figure i: Pre-test and Post-test mean scores of students exposed to team teaching strategy and conventional method

Hypothesis 1: There is no significant difference in the pre-test mean scores of students exposed to team teaching strategy and conventional method

Table 2: t-test analysis for Pre – test Mean Scores of Students in Experimental and Control Groups

Variations	N	Mean	SD	df	tvalue	P
Team teaching Strategy	79	13.19	2.14	161	0.253	0.800
Conventional	84	13.11	2.03			

P>0.05

Table 4 shows that the t-value is 0.253 as the difference in the pre-test mean scores is not significant because the P value (0.800) > 0.05 at 0.05 level of significance. This implies that null hypothesis is not rejected. Hence, there is no significant difference in the pre-test mean scores of students exposed to team teaching strategy and conventional method. The students in both groups were homogeneous at the commencement of the study.

Hypothesis 2: There is no significant difference in the post-test mean scores of students exposed to team teaching strategy and conventional method.

Table 3: t-test analysis for Post – test Mean Scores of Students in Experimental and Control Groups

Variations	N	Mean	SD	df	tvalue	P
Team teaching Strategy	79	31.86	2.58	161	34.873	0.000*
Conventional	84	19.87	1.76			

*P<0.05

Table 5 shows that the t-value is 34.873 as the difference in the post-test mean scores is significant because the P value (0.000) < 0.05 at 0.05 level of significance. This implies that null hypothesis is rejected. Hence, there is significant difference in the post-test mean scores of students exposed to team teaching strategy and conventional method. The mean score showed a significant difference of 11.99 in favour of students exposed to team teaching strategy.

Hypothesis 3: There is no significant difference in the pre-test and post-test mean scores of students exposed to team teaching strategy.

Table 4: Analysis of Covariance (ANCOVA) for Pre - test and Post - test Mean Scores of Students under the Groups

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	5854.394 ^a	2	2927.197	604.311*	.000
Intercept	2646.846	1	2646.846	546.433*	.000
Pre-test	.011	1	.011	.002	.963
Groups	5852.364	1	5852.364	1208.203*	.000
Error	775.017	160	4.844		
Total	114130.000	163			
Corrected Total	6629.411	162			

a. R Squared = .883 (Adjusted R Squared = .882) * P < 0.05

The result presented in Table 6 shows that there is a significant difference in the pre - test and post-test mean scores of students in the groups (Team teaching Strategy and Conventional method) as P= 0.000<0.05. There is a strong evidence to reject the null hypothesis which states that there is no significant difference in the pre-test and post-test mean scores of students exposed to team teaching strategy and conventional method. This result led to the rejection of the null hypothesis. By implication, there is significant difference in the pre-test and post-test mean scores of students exposed to team teaching strategy and conventional method. In order to find out the more probable effective strategy, Multiple Classification Analysis (MCA) was carried out. The result is shown in Table 5.

Table 5: Multiple Classification Analysis (MCA) of students' performance in Basic Science by treatment

Grand Mean = 25.73						
Variable + Category	N	Unadjusted Dev'n	Eta ²	Adjusted Independent + Covariate	for	Beta
Experimental (Team teaching Strategy)	79	6.13	.94	6.06		.09
Control	84	-5.86		-5.95		
Multiple R						.939
Multiple R ²						.883

The result in Table 5 shows the Multiple Classification Analysis (MCA) of students' performance in Basic Science by treatment. It reveals that, with a grand mean of 25.73, students exposed to team teaching strategy had higher adjusted mean score of 31.86(25.73+6.13) than their counterparts in the control group with control group 19.87(25.73+(-5.86)). This means that team teaching strategy was the more effective strategy of teaching Basic Science than conventional method. There was a very high multiple relationship ($R= 0.939$) between the two groups and academic performance of students in Basic Science. The two treatment strategies can also account for 88.3% variability in academic performance of the students in Basic Science. It means there is a need for other researchers to find other teaching strategies (other than the two strategies under consideration) that could account for 11.7% of the variability in academic performance of students in Basic Science.

Discussion

The findings of the study revealed that there was no significant difference in the pre-test mean scores of students exposed to team teaching strategy and conventional method. The students in both groups were homogeneous at the commencement of the study. The findings of the study, which indicated no significant difference in the pre-test mean scores between students exposed to a team teaching strategy and those taught using a conventional method, offer valuable insights into the realm of education. This finding aligns with established principles Lesely (2007) and Akpan, et al. (2013), where it is often deemed crucial to ensure that experimental groups are comparable at the beginning of a study. Homogeneity in pre-test scores between the two groups is indicative of a well-designed study, as it helps eliminate potential bias stemming from initial disparities in student abilities or knowledge levels. By achieving this homogeneity, researchers can attribute any subsequent differences in learning outcomes more confidently to the teaching method itself rather than to pre-existing disparities among students.

Findings from Kochar, (2000) and Wilson and Michaels (2011) have consistently emphasized the importance of controlling for pre-existing differences among participants to obtain reliable results. Research designs that achieve homogeneity in pre-test scores enhance the internal validity of studies, increasing the trustworthiness of the conclusions. To gain a deeper understanding of the implications of this study, it would be valuable to examine additional research that delves into the long-term learning outcomes associated with these teaching methods. While pre-test scores provide an initial snapshot of student performance, educational research often looks beyond these preliminary measures to assess the lasting impact of different teaching strategies on student knowledge retention, critical thinking skills, and overall academic success. In conclusion, the finding of no significant difference in pre-test mean scores between students exposed to a team teaching strategy and a conventional method underscores the importance of initial equivalence in research. It also highlights the need for further investigation into the specific dynamics of these teaching methods and their effects on long-term learning outcomes.

It was also revealed that there was significant difference in the post-test mean scores of students exposed to team teaching strategy and conventional method. The mean score showed a significant difference of 11.99 in favour of students exposed to team teaching strategy. The finding of a significant difference in the post-test mean scores between students exposed to a team teaching strategy and those taught using a conventional method carries

significant implications for educational research and practice. This result indicates that, following the instructional period, students who experienced the team teaching strategy performed significantly better, with a mean score difference of 11.99 points in their favor, compared to their counterparts in the conventional teaching group.

A significant difference in post-test scores in favor of team teaching suggests that this collaborative approach had a more positive effect on student learning compared to the conventional method. This finding is in line with Kochar (2000) and Wilson and Michaels (2011) who affirmed that several factors may contribute to the success of team teaching strategies. Research has shown that collaborative teaching can foster a more interactive and engaging learning environment, as students benefit from a diversity of perspectives and teaching styles. Additionally, team teaching can be particularly effective in promoting critical thinking, problem-solving skills, and deeper understanding of complex subjects. The findings agreed with Andrews (2016) and Maultsby and Barbara (2019) that showed a progress in the student's achievements in the schools in which team teaching is implemented.

On the other hand, the conventional teaching method, while often reliable, may sometimes rely on more traditional didactic approaches. This can limit student engagement and fail to tap into the benefits of active and collaborative learning, which are emphasized in contemporary educational research. Furthermore, the significant difference in post-test scores highlights the importance of not only initial knowledge acquisition (as assessed by pre-test scores) but also long-term retention and comprehension of the material. While pre-test scores indicated no significant differences between groups at the outset, the post-test scores suggest that the team teaching strategy had a superior impact on students' ability to retain and apply what they learned over time. The findings also agree with Richards (2011) who showed that there are significant differences between the two groups in the post test in favor of team teaching.

The significant difference in post-test mean scores favoring students exposed to the team teaching strategy underscores the potential benefits of collaborative and interactive teaching methods in education. This finding supports the idea that innovative pedagogical approaches, such as team teaching, can enhance student learning outcomes beyond what conventional methods may achieve. It also highlights the importance of assessing not only immediate knowledge acquisition but also the lasting impact of teaching strategies on students' overall understanding and retention of the material.

The findings of the study revealed that there is significant difference in the pre-test and post-test mean scores of students exposed to team teaching strategy and conventional method. There was a very high multiple relationship ($R = 0.939$) between the two groups and academic performance of students in Basic Science. The two treatment strategies can also account for 88.3% variability in academic performance of the students in Basic Science. The findings of this study, indicating a significant difference in both the pre-test and post-test mean scores between students exposed to a team teaching strategy and those taught using a conventional method, are of considerable significance in the field of education. Additionally, the reported high multiple relationship ($R = 0.939$) between the two groups and their academic performance in Basic Science, along with the assertion that these treatment strategies can account for 88.3% of the variability in academic performance, highlights the substantial impact of instructional methods on student learning outcomes.

The observed significant difference in pre-test and post-test scores suggests that the choice of teaching method plays a crucial role in shaping students' knowledge acquisition and

retention over time. This finding aligns with Richards (2011), Baniabdelrahman (2013) and Andrews (2016) which consistently emphasizes the importance of effective teaching strategies in influencing student achievement. The post-test scores, in particular, reflect the effectiveness of these strategies in facilitating long-term learning and understanding of the subject matter.

The high multiple relationship ($R = 0.939$) signifies a strong association between the two treatment groups (team teaching strategy and conventional method) and students' academic performance in Basic Science. This strong relationship suggests that the teaching method employed has a substantial influence on students' overall academic achievement. In the literature, the strength of the relationship between teaching methods and student outcomes is a topic of interest, with researchers exploring various factors that contribute to effective pedagogical practices. Moreover, the assertion that these treatment strategies can account for 88.3% of the variability in academic performance underscores the importance of instructional choices in explaining students' success in Basic Science. This high percentage of variability explained suggests that the teaching methods themselves have a substantial impact on academic performance. Baniabdelrahman (2013) affirmed the benefits of team teaching and advise teachers to use team teaching strategy in their classrooms.

The study's findings align with Richards (2011) and Haghghi and Abdollahi (2014) that highlights the benefits of collaborative and interactive teaching methods, such as team teaching, in enhancing student learning outcomes. These methods can promote engagement, critical thinking, and a deeper understanding of subject matter, which can contribute to improved academic performance. The study's findings emphasize the substantial impact of teaching methods on student learning outcomes in Basic Science. The significant differences in pre-test and post-test scores, the strong multiple relationship between teaching strategies and academic performance, and the high percentage of variability explained highlight the crucial role of pedagogical choices in shaping students' educational experiences.

Conclusion

Based on the findings of this study, it could be concluded that, the two groups (Team teaching Strategy and Conventional Method) were homogenous at the commencement of the experiment. The use of team teaching strategy enhanced students' performance in Basic Science more than the conventional method.

Recommendations

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

1. The use of team teaching strategy should be encouraged in Basic Science class in secondary schools to enhance better students' academic performance in Basic Science.
2. The Ministry of Education should offer professional training and re-training to Basic Science teachers through workshops and seminars to enhance their skills in team teaching and collaborative pedagogical practices. Training should focus on effective communication, coordination, and synergy among teachers to maximize the benefits of team teaching.

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