



Effect Of Team-Teaching Strategy On Academic Achievement And Interest In Basic Science Concepts Among Junior Secondary School Students In Yobe State, Nigeria

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ABSTRACT

This study investigated the effect of team-teaching and interest on academic achievement in Basic Science among Junior Secondary School Students in Yobe State, Nigeria. The study used quasi-experimental control group design involving pre-test and post-test. The experimental group was exposed to the treatment using team teaching techniques while the control group was exposed to single-teacher teaching techniques (conventional). The tests were conducted to both groups of students in order to determine the students' performance and interest in Basic Science at JS2 level. The population of the study covers all government day JS2 students in Yobe State. Random technique was used in selecting the schools and "Energy" as a topic was selected for the study. The Instruments for the study are: Basic Science Academic Performance Test (BSAPT) and Students Interest Questionnaire (SIQ). BSAPT contained 30 multiple choice items while SIQ contained forty (40) statements. The Kuder Richardson Correlation Coefficient statistics of r value was found to be 0.77 on Students' interest Questionnaire and the reliability of the instrument was determined through the test-retest method and was analyzed by using Kuder-Richardson (KR- 20) reliability coefficient. After the treatment administration for six (6) weeks, the researcher conducted the post-test to the subjects. The results indicated that exposure of student to Basic Science increased interest level to 0.92 from the mean score. Furthermore, interest level of males taught Basic Science, using team teaching strategy was 1.2 less than that of female students. Recommendations were highlighted in the study.

Keywords: Basic Science, team teaching strategy, academic achievement, students

INTRODUCTION

The system of education which Nigeria inherited from the colonial administration had some defects in terms of its content and philosophy, with respect to the needs of the country (Obodo, 2004). The defects manifested in the inability of the educational system to meet the manpower needs of the fast growing Nigerian economy. This led to policy changes that brought about the National Policy on Education and its consequent changes in the Nigerian system of education.

The revised edition of National Policy on Education (FRN, 2004) gave science, technical and vocational education prominence at all levels of education in Nigeria. Science education should emphasize the teaching and learning of science process and principles such as observation, classification, measurement, experimentation and prediction. The National Policy on Education (FRN, 2014) opined that such processes and principles will lead to fundamental and applied research in the sciences at all levels of education.

In response to this problem, there arose the need for science curriculum reforms at all levels of education. At Junior Secondary level the reform was based on Basic Science. As a step towards presenting science to the child, reflecting the culture and tradition of Nigerians, the idea of the Nigerian Integrated Science Project (NISP) was born in 1968 and was first published in 1971 (STAN, 1968) which was an attempt to teach science as a unified whole. According to the Science Teachers

Association of Nigeria (1970) cited in Ogunniyi (1986), Nigerian Integrated Science Project should enable students to be able to:

- observe carefully and thoroughly;
- report completely and accurately;
- organize information acquired;
- generalize on the basis of acquired information;
- predict as a result of the generalizations; design experiments (including controls, where necessary, to check the predictions);
- use models to explain phenomena, where appropriate; and
- continue the process of inquiry when new data do not conform to predictions.

To achieve these noble objectives, there should be well trained teachers, available learning materials and equipment under ideal environment so that gender boundary should not be regarded as others argued. In a modern world where women make up over half the workforce (Adya & Kaiser, 2005), it seems only fair that women should have an equal opportunity to pursue whichever career they choose.

Results from researches on the teaching of Basic Science revealed that teachers predominantly use lecture method in Science lessons ((IBE, 2005). This may suggest that teachers do not vary their teaching methods from time to time. It may also be suggested that activities carried out are not stimulating enough. The key concepts in the process of science, i.e. observing things, reporting activities, measuring things were not adequately carried out. This may not help in laying a good foundation for scientific knowledge and advancement (Aworanti, 2009). These have serious implications for academic achievement in Basic Science. Findings also indicated that team teaching has a positive impact on students' academic achievement. Such studies include Nzewi (1995) who observed that team teaching has a positive effect on students' performance in Social Studies as they interact in the process of solving the problem together.

Bimbola and Daniel (2010) said that Basic Science plays vital role in Nigerian science education programme because it prepares pupils at the Junior Secondary School level for the study of core science subjects at the Senior Secondary School level which in turn brings about students' interest in science oriented courses at the tertiary institutions.

Aiyedun (2000) viewed that girls are born with less Basic Science ability than boys. The result of his study on influence of sex differences in Basic Science achievement using 500 students randomly selected from 15 secondary schools in Kwara state revealed that Integrated Science achievement does not depend on sex. It was therefore, recommended that equal opportunity and privilege should be given to both male and female Basic Science students. Some researchers believe that girls' performance in mathematics and science suffer considerably as a result of the influences and expectations of society (Heather, 2007). The more feasible approach is to discover the most prevalent symptoms of the problem of the gender gap in science education (e.g., belief in stereotypes, lack of science self-confidence, dissatisfaction with the way science is presented) and address these with treatments such as Team-Teaching perhaps, with enough widespread treatments the gender gap will become negligible or a mere memory.

METHODOLOGY

The study investigated the Effect of Team-Teaching on the Academic Achievement and Interest in Basic Science at JSS II level in Potiskum Educational Zone. The methodology is discussed under the following subheadings:

Research Design, Population of the Study, Sample and Sampling Technique, Instrumentation, Pilot Testing, Training of Research Assistants, Validation of the Instruments, Reliability of the Instruments, Procedure for Data Collection and Data Analysis

Research Design

This research study used quasi-experimental control group design involving pretest and posttest. The pretest and posttest was administered to the two groups (experimental and control). The pretest was administered to the subjects in order to determine their academic ability level before the treatment, while posttest was administered after the treatment. The experimental group was be exposed to treatment using team teaching techniques while the control group was exposed to individualized teaching techniques (conventional). The design of the study is illustrated in Figure 3.1.



G_1 ————Experimental group

G_2 ————Control group

X_1 ————Team-Teaching

X_0 ————Single-Teacher Teaching

A-----Academic Achievement

I-----Interest

O_1 ————Pre-test

O_2 ——Post-test for experimental and control group respectively.

Fig 3.1 Research Design

3.3 Population of the Study

The population of the study is all government junior secondary two [JS 2] students in Potiskum educational zone, Yobe State. There are 16 junior secondary schools running Basic Science Programme with a population of 3,597 boys, 2,330 girls, and a total of 5,927 students in the study area. All those schools running co-educational (mixed) were involved but single sex school were excluded for the study. The summary of the population is presented in Table 3.1.

Table 3.1 Study Population

S/N.	Name of school	Enrolment		
		Boys	Girls	Total
1	G.D.J.S.S. Chadi	358	206	564
2	G.D.J.S.S.Kara	648	388	1036
3	G.D.J.S.S. Arikimi	421	162	583
4	G.D.J.J.S.S. Mamudo	186	81	267
5	G.D.J.S.S.Dorawa	258	265	523
6	G.D.J,S. S. Yarimarari	95	55	150
7	G.D.J.S.S. Badejo	70	60	130
8	G.D.J.S.S. Garbawa	82	63	145
9	G.D.J.S.S. Bula	33	12	45
10	G.D.J.S.S. Jumma'a	85	57	142
11	G.D.J.S.S. Dakasku	39	31	70
12	G.D.J.S.S. Danchuwa	54	25	79
13	G.D.J.S.S. Sabon Gari	8	16	24
14	G.D.J.S.S. Yindiski	35	29	64
15	G.D.J.S.S. Central Pot.	720	531	1251
16	G.D.J.S.S. Sabon Layi	513	362	875
	Total	3597	2330	5927

Source: State Universal Basic Education Board (SUBEB) Yobe State (2009)

The researcher used JS2 students for the study. This is because JS3 students were preparing for their JS3 final examination and JS1 are just fresh junior secondary school students from primary school system.

Sample and Sampling Techniques

Four schools were selected out of 16 schools from Potiskum educational zone by using simple random sampling involving balloting method. Out of the four schools the researcher sampled only two equivalent schools that were used for the study. The two groups were also selected for team-teaching and single teacher-teaching strategy by using simple random sampling techniques.

They were forty (40) males and thirty-three (33) females in the experimental group while in control group they were forty-seven (47) males and thirty-four (34) females.

Instrumentation

The researcher used two instruments for the study. The instruments are Basic Science Achievement Test (BSAT) and Students’ Interest Questionnaire (SIQ). Basic Science Achievement Test contains 30 multiple choice items while Students’ Interest Questionnaire (SIQ) contains twenty (20) statements. The chosen topics which were taught using team-teaching were shared by two Basic Science teachers while the control group was taught by a single teacher. Both groups were supervised by the researcher. The main topic dealt with was “Energy” in which the sub-headings were broken into: forms of energy, sources of energy, energy conversion, uses of energy, energy classification, and energy sort cards.

Table 3.3 Table of Specification Based on Number of Questions per Topic

Content/Objective	Weight	Knowledge	Comprehension	Application	Total
	%	35%	35%	30%	100%
Energy	30	2	2	2	6
Forms of energy.	10	1	2	1	4
Sources of energy	15	2	1	1	4
Energy conversion	15	1	1	2	4
Uses of energy	10	2	1	1	4
Energy classificatn.	10	1	2	1	4
Energy sort cards	10	1	1	2	4
Total	100	10	10	10	30

Source: Adapted from Obeka (2009).

Pilot Testing

The pilot study was conducted in one Government Day Junior Secondary School Dambam, Bauchi State. The subject used in the pilot study comprised a total of 33 students in JSS 2. Before then, the researcher applied for permission through the principal of the school to the class teacher to enable him access to the class used for pilot study. This feasibility study was a small experiment designed to test logistics and gather information prior to a larger study in order to make some adjustments where necessary and to improve the latter’s quality and efficiency i.e the information obtained on logistical issues were incorporated into the main study designed.

Selection of Research Assistants

The researcher selected three Basic Science teachers in the selected schools. Two teachers teaching this Basic Science used team-teaching strategy and taught the first group, one teacher used a single-teacher teaching who taught the second group. All the teachers were graduates in Science Education and were supervised by the researcher.

Training of Research Assistants

The researcher trained two (2) research assistants for the study. The researcher used five-day intensive training to the research assistants in order to get them acquainted with the method used during instruction for six (6) weeks. During the training, the researcher coached the research assistants on how to go about the Team-Teaching Models (lesson planned) and the steps to be followed. The researcher also taught the research assistants how to handle the instructional materials in the class, i.e how and when to use them in the class. The second teacher taught the second group using single-teacher teaching technique all alone.

Validation of the Instruments

The constructed instrument contained 30 items Basic Science Achievement Test (BSAT) and 20 Basic Science Interest Questionnaire (BIQ) which were used for final data collection. The instruments were

validated by the Basic Science specialists in measurement and evaluation from Curriculum Department. Also two experienced secondary school teachers from Basic Science Department and two lecturers from F.C.E (T) Potiskum validated the items. Their criticisms, comments, corrections, suggestions, and recommendations were affected to produce the final version.

Reliability of the instruments

The reliability coefficient of a test can be determined by different methods such as test-retest, split-half, parallel test etc. In this study the test retest reliability coefficient was used and the analysis using Pearson Product Moment Coefficient (PPMC) scores was obtained from the pilot testing of the Basic Science Achievement Test (BSAT). The reliability coefficient for the test was found to be 0.87. And the interest in team teaching strategy was analyzed by using split-half method. The Kuder Richardson correlation coefficient statistics of r value was found to be 0.77 of Students' Interest Questionnaire the second instrument indicating that the instruments for the study were reliable.

Treatment

The researcher and assistants administered the test to the two groups as the pre-test. After the pre-test, the researcher and the assistants under the guidance of the researcher administered the treatment for six weeks. After each lesson presentation, the two teachers teaching the first group using team-teaching meet and make observations, suggestions. They also checked the strength and weaknesses of the strategy and make some adjustments where necessary. The teacher who taught the second group used same period using single-teacher teaching technique. The treatment last for six (6) weeks, after which the examination (post test) was conducted to both groups.

Procedure for Data Collection

The researcher sought permission from the principals of the selected schools to allow their schools to be used for the study. The researcher and the research assistants conducted the pre-test to both groups of students to determine their entry level and they were post-tested after they had undergone the treatment for six (6) weeks. The first group was taught by two teachers using team-teaching strategy, while the second group was taught by one teacher using single teacher-teaching strategy. Each of the groups, experimental group (team teaching group) and control (Conventional) taught for six weeks. At the end of the six weeks, the Basic Science Achievement Test (BSAT) was administered as a post-test to the students in the two groups and administer questionnaire immediately.

Procedure for Data Analysis

When the data were collected, the researcher took the result to the statistician for the analysis. The result obtained was used to answer research questions and test the null hypotheses at 0.05 alpha levels of significance.

DATA ANALYSIS

Research question 1: *What is the difference in academic achievement between students who are exposed to team-teaching with those that are exposed to single-teacher teaching?*

Table 4.2.1: The Mean Score of Students Exposed to Team-Teaching and those Exposed to Single-Teacher Teaching Strategies

Groups	N	Mean	Std.dev	Std. Err
G ₁ Experimental (using team-teaching)	50	33.105.	20	.73
G ₂ Control (single-teacher teaching)	50	32.06	5.31	.75

Based on the results in Table4:2:1indicates that the mean achievement score of students in the experimental group was 33.10 and the mean achievement score of students in the control group was 32.06. Students in the experimental group have the mean achievement score of 1.04 higher than the control group.

Research question 2: *What is the effect of team teaching strategy on interest of JSS Basic Science students?*

Table 4.2.2: The Mean Difference of Effect of Team Teaching Strategy on Interest of JSS Basic Science Students

Interest	N	Mean	Std.dev	Std. Err
Before exposure to team teaching	50	55.82	18.47	2.61
After exposure to team teaching	50	64.60	14.93	2.11

The result in Table: 4.2.2 reveals that there is difference between the mean scores on interest of JSS Basic science students before and after exposure to team teaching. This is because the mean score of interest of students before exposure to team teaching was 55.82 and it roused to 64.60 after exposure to the team teaching strategy. The difference between the interest of students before and after exposure to team teaching is 8.78. This indicates that students have developed interest in Basic Science after the exposure to team teaching Strategy.

Testing of Research Hypotheses

Hypothesis One (H₀₁) There is no significant difference between the mean achievement scores of students taught Basic Science using team-teaching strategy and those taught with single-teacher teaching strategy.

Table 4.3.1: Independent t-test sample statistic on the Difference between the Mean Achievement Scores of Students Taught Basic Science using Team-teaching Strategy and those taught with single-teacher teaching strategies.

Groups	N	Mean	Std.dev	Std. Err	df	t-cal.	t-critical	Sig (p)
Team-teaching	50	33.10	1.99	.735	98	0.99	1.96	0.33
Single-teacher teaching	50	32.06	5.31	.751				

Calculated t < 1.96, calculated p > 0.05

The result in Table 4.3.1 shows that t-cal (0.99) is less than t-critical (1.96) at df 98. Also, p-value of 0.33 is greater than alpha level of significance ($p \leq 0.05$). Based on these results in Table 4.3.1, the research Hypothesis One (1) which states that “ There is no significant difference between the mean achievement scores of students taught Basic science using team-teaching strategy and those taught with single-teacher teaching strategy is therefore rejected. While the t-calculated value of 0.99 is less than the t-critical value of 1.96 at df 98 and the mean achievement scores were 33.10 and 32.06.

Hypothesis Three (H₀₂): There is no significant difference in the interest of Basic Science Students before and after exposure to team teaching.

Table 4.3.2: Paired Sample t-test statistic in the Difference on the Interest of Basic science Students before and after exposure to Team Teaching Strategy

Interest	N	Mean	Std.dev	Std. Err	Df	t cal.	t-critical	Sig (p)
Before exposure	50	55.82	18.47	2.61	48	3.74	1.96	0.00
After exposure	50	64.60	14.93	2.11				

Calculated t > 1.96, calculated p < 0.05

The result in the Table 4.3.2 indicates that the alpha level of significance ($p \leq 0.05$) is greater than the calculated p-value of 0.00, while the t-calculated value of 3.74 is greater than the t-critical value of 1.96 at df 48. The mean interest level scores were 55.82 and 64.60 before and after exposure to team teaching strategy respectively. This implies that students’ interest in Basic science is significantly higher after being exposed to team teaching strategy. The null Hypothesis two (H₀₂) which states that “There is no significant difference in the interest of Basic Science students before and after exposure to team teaching strategy” is hereby rejected in favour of single teacher since the result of the paired

sample t-test statistic revealed that there is significant difference in the interest of Basic Science students before and after exposure to team teaching strategy.

Summary of Findings

The following are the major findings of this study:

1. Students in the experimental group have 1.04 achievement scores higher than their counterparts in control group taught with single teacher teaching strategy) in Basic Science at JSS levels. This finding is in line with Karin (2000) who stated that team teaching is used in increasing the students' level of understanding and interest, in addition to enabling the students to obtain higher achievement.
2. The mean interest level scores of students before exposure to team teaching strategy was 55.82 and the mean interest level scores of students after exposure to team teaching strategy was rouse to 64.60. This implies that students' interest in Basic science have significantly higher after being exposed to team teaching strategy with 8.78 interests in Basic Science than before exposure to team Teaching strategy.

DISCUSSION

The data collected for this study were based on the Basic Science Academic Achievement test (BSAT) and responses obtained from the Students' Interest Questionnaire (SIQ). They were analyzed in line with the focus of the research questions and research hypotheses which were formulated in the design of the study. According to the outcome from Table 4.2.1, the mean achievement scores of students in the experimental group were 33.10 as compared to those of control group with the mean score of 32.06. This shows that students in the experimental group (taught by team-teaching strategy) have the mean achievement scores of 1.04 higher than their control group counterparts (taught by single-teacher teaching).

The result in the Table 4.2.3 reveals that there is difference between the mean scores on interest of JSS Basic Science students before and after exposure to team teaching. This is because the mean score of interest of students before exposure to team teaching was 55.82 and it rose to 64.60 after exposure to the team teaching strategy, meaning that the change in interest after the exposure to the team teaching strategy was 8.78.

The result in Table 4.3.1 shows that $t\text{-cal}$ (0.99) is less than $t\text{-critical}$ (1.96) at df 98. Also, $p\text{-value}$ of 0.33 is greater than alpha level of significance ($p \leq 0.05$). Based on these results in Table 4.3.1 the research hypothesis one (1) which states that " There is no significant differences between the mean achievement scores of students taught Basic science using team-teaching strategy and those taught using single-teacher teaching strategy is therefore accepted. Since the calculated $p\text{-value}$ of 0.33 is greater than the 0.05 alpha level of significance while the $t\text{-calculated}$ value of 0.99 is less than the $t\text{-critical}$ value of 1.96, at df 98.

The finding of this hypothesis is in agreement with what Ubah (2005) who stated that the performance of junior secondary students in mathematics was dependent on the method used and the teacher, which is also in conformity with the findings of Doebler (1996) whose finding revealed that team teaching was effective in the learning of educational technology.

Table 4.3.3 indicates that the alpha level of significance ($p \leq 0.05$) is greater than the calculated $p\text{-value}$ of 0.00, while the $t\text{-calculated}$ value of 3.74 is greater than the $t\text{-critical}$ value of 1.96, at df 48. The mean interest level scores were 55.82 and 64.60 before and after exposure to team teaching strategy respectively. This implies that students' interest in Basic science is significantly higher after being exposed to team teaching strategy. The null Hypothesis Three (H_0_3) which states that "There is no significant differences in the interest of Basic Science students before and after exposure to team teaching strategy" is hereby rejected since the result of the paired sample t-test statistic revealed that there is significant difference in the interest of Basic Science students before and after exposure to team teaching strategy as seen in Table 4.3.3. This result agreed with the finding of Karin (2000) and Uwameiye & Ojikutu (2008) who carried out a study on Effect of Team Teaching on the Academic Achievement of Students in Introductory Technology.

CONCLUSION

The following conclusions are made based on the findings of the study:

1. Team Teaching encourages corporation, share ideas, patience and tolerance and encourages unity, friendship, cohesion interaction and sociable among teachers. The cooperation of students observed

between the team teachers serves as a model for teaching students positive teamwork skills and attitudes.

2. Students develop high interest in learning of Basic Science Concepts when Team Teaching Strategy is used in learning and teaching.

3. Team Teaching increases positive attitude change among both teachers and students as they discuss issues together and lead to their creativity among others.

RECOMMENDATIONS

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

1. Teachers of Basic science should be encouraged by the school management to attend seminars, workshops and conferences during long vacation to adopt how to use team teaching strategy or update them with the knowledge on team teaching strategy.
2. Stakeholders, especially commissioners for education, directors of schools, principals and other resource personnel should always emphasize on the use of team teaching for instruction in the class especially the teachers in the service.
3. Teachers of Basic science in Potiskum local government Yobe State should be encouraged to adopt constructive team discussion to increase their knowledge on team teaching strategy at JSS two (2) level in secondary schools.
4. Teachers and students should be encouraged to solve class problem so that the spirit of team working will be developed among students.

More emphasis should be placed on incorporating team teaching into all courses in the department of Basic Science Education.

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