



Effectiveness of Cooperative Learning Strategy on the Learning Outcomes of Students in Basic Science in Junior Secondary Schools in Osun State

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ABSTRACT

The study investigated the effectiveness of cooperative learning strategy on students' achievement in Basic Science in Iwo Local Government Area of Osun State. It also determined the effect of the strategy on students' attitude towards the learning of Basic Science in Junior Secondary Schools and finally assessed the effect of the strategy on students' gender on the learning outcomes of students in Basic Science. These were with a view to improving students' performance in the subject.

The study employed the equivalent groups pretest, post-test, control group, quasi experimental research design. The population for the study comprised all Junior Secondary School II students in Iwo Local Government Area of Osun State. Two schools were selected randomly using simple random sampling technique. From the selected schools, two intact classes of JSS II students were also randomly selected using simple random sampling technique. In all, sixty students were used for the study. Two instruments were used for data collection. They are: Test of knowledge in Basic Science (TKBS) and Students' Attitude Questionnaire (SAQ) towards the learning of Basic Science. Data collected were analysed through mean, standard deviation and t-test analysis.

The results of the study showed a significant difference in the achievement of students exposed to cooperative learning and those taught with teacher

expository method ($t=4.643$; $p<0.05$). Students in cooperative learning group performed better than those in teacher expository method. The results further revealed a significant difference in the attitude of students exposed to cooperative learning after the treatment ($t=41.04$; $p<0.05$) and the results finally showed that gender has no effect on students' academic performance ($t=0.748$; $p > 0.05$).

The study concluded that cooperative learning strategy is a better and innovative method in improving students' academic performance in Basic Science.

Keywords: *Effectiveness, Cooperative, Learning outcomes, Attitude, Basic Science*

Introduction

Science is the knowledge about the physical and natural world based on facts that can be proven experimentally and it is a major subjects studied right from the elementary schools in our country. According to National Policy on Education (FRN, 2004), science must develop in individual the habit of cultivating and developing rational mind for the good conduct of good life in the society and also produce scientists for national development. For these to be actualised, the Federal Government of Nigeria included in her school curriculum the teaching of Basic Science right from the elementary schools to

junior secondary school level after which a child is expected to, among other things, acquire knowledge in science through study, practise, observation and experimentation so as to explain natural phenomenon.

The recent socio-political and economic changes in the global world have brought about changes in our educational aims, objectives and goals and greater challenges for basic science. The schools are looked upon not only to equip the individual with the basic knowledge in the sciences but also with higher cognitive skills such as problem-solving and reflective skills that allow for self development and self-reliance. To meet up with these challenges, there is a movement away from the behaviourist method of direct teaching like the lecture method, note taking and dictations, where the student is given content to memorize. In order to implement the National Policy on Education (2004), the government at all levels became the schooling process in terms of educational outcomes, learning activities, instructional resources, instructional strategies and evaluation procedures. In view of this, emphasis has been placed on the need to;

- Make educational activities centre on the learner for maximum self development and self fulfilment; and
- Structure the educational system to develop the practice of self learning (FRN, 2013). The implication of these for teachers are that they should develop a teaching approach which encourages the learners full participation in their learning process.

Despite the efforts of government in restructuring the educational system to develop the practice of self-learning in schools, the dominant approach to instruction has been the expository type especially since the inception of Western Education in 1983. Students still perform poor in Basic Science examinations both at internal and external examinations. Studies associated this poor performance to inappropriate teaching methods used by science teachers in schools and students' interest in learning science (Ojedokun & Aladejana, 2012; Sowumi & Aladejana, 2016). Rarely do science teachers use innovative teaching methods which have been proven effective in developed countries like USA, Canada France and so on (Bransford, Brown & Cocking, 1999). Science classrooms are becoming more diverse with differences in terms of environment, students' background and students' interest. Studies have shown that cooperative learning

strategy had improved students' performance in science subjects (Physics, Biology, Chemistry, Mathematics).

Cooperative learning is a collective intellectual donation aimed at sharing with others that are not intellectually talented and serving as an avenue for brilliant students to revise their embedded knowledge, making it easy for both to achieve the learning objectives. Cooperative learning becomes relevant through interaction. Cooperative learning activities instill in learners important behaviours that prepare them to reason and perform in an adult world (Johnson & Johnson, 2009)). Educators use cooperative learning method in all grade levels, in all curriculum area, and for many different purposes, but the entire use centre around the goal of getting students to understand and learn the materials presented. Cooperative learning allows students to communicate their ideas with each other, brainstorm responses, and work to solve problems together.

Cooperative learning is important in helping learners acquire from the curriculum the basic cooperative attitudes and values they need to think independently inside and outside of the classroom. Academic achievements of students have been found to be enhanced by the use of cooperative learning (Johnson & Johnson, 1989). Fabio and Laura (2010) stated that, the fact that it has been linked to increase in the academic achievement of learners at all ability level is another reason for its use. Johnson (2009), Fencil and Scheel (2005), in their contributions, noted that cooperative learning activity engages the student in the learning process and seeks to improve the critical thinking, reasoning, and problem-solving skills of the learner, while research efforts on cooperative-learning indicate that it enhances students' achievement (Johnson & Johnson 1989), Gilles and Adrian (2003) stated that peer interaction is central to the success of cooperative learning as it relates to cognitive understanding. There is therefore the need to investigate the extent to which this learning strategy will help in improving students' learning outcomes in Basic Science as well as improve students' attitude towards science learning in general.

Statement of the Problem

Studies have shown that students' performance and attitude towards the learning of Basic Science have been consistently poor at the Junior Secondary Schools (JSS) level. This may be due to the teaching method employed by the teachers in teaching the

subject at JSS level, which still remains largely teacher-centered. A number of innovative teaching methods have been devised to teach Basic Science at this level of education among which is cooperative learning. However, the extent to which this method could be used in improving students' academic performance as well as improving their attitudes towards the learning of Basic Science has not been adequately focused and reported in literature, hence this study.

Purpose of the Study

The study aims at investigating the effectiveness of cooperative learning strategy on students' achievement in Basic Science in Iwo Local Government Area of Osun State.

The specific objectives of the study are to;

- (i) Examine the effectiveness of cooperative learning strategy on students' achievement in Basic Science in Junior Secondary Schools (JSS) in Osun State;
- (ii) Determine the effectiveness of cooperative learning strategy on students' attitude towards the learning of Basic Science in JSS in Osun State; and
- (iii) Assess the effect of the strategy on students' gender on the learning outcomes of students' in Basic Science in JSS in the study area.

Research Hypotheses

1. There is no significant difference in the performance of students exposed to cooperative learning strategy and those taught using the traditional classroom teaching method.
2. There is no significant difference in the attitude of students exposed to cooperative learning strategy before and after the treatment.
3. There is no significant difference in the performance of male and female students exposed to cooperative learning strategy in Basic Science.

Methodology

Research Design

The study employed the equivalent groups' pre-test, post-test, control group quasi-experimental research design. There is one experiment group and one control group. The design for the study is shown below:

$$K_1 \quad X_1 \quad K_2$$

$$K_3 \quad X_2 \quad K_4$$

where,

K_1 and K_3 represent the pre-test scores in the two groups and K_2 and K_4 represent the post-test scores in the two groups.

Also, X_1 is the experimental group while

X_2 is the control group that uses the traditional approach of teaching.

Population of the Study

The population for the study comprised all Junior Secondary School two students (JSSII) in Iwo Local Government Area of Osun State.

Sample and Sampling Technique

The sample consisted of 60 students. Two intact classes of JSSII students were selected from two randomly selected secondary schools using simple random sampling technique in Iwo Local Government Area of Osun State.

The schools used for the study are:

NUMBER OF STUDENTS

Name Of School	M	F	Total	Treatment
A.U.D Middle School	13	17	30	Experiment
Islahudeen Middle School	16	14	30	Teacher-Expository Method
Total	29	31	60	

Research Instruments

The two instruments used for the data collection are:

1. Test of knowledge in Basic Science (TKBS) and
2. Students' Attitude Questionnaire towards learning of Basic Science (SAQ)

Test of knowledge in Basic Science (TKBS)

➤ This consisted of two sections. Section A sought for demographic information of the respondents while section B consisted of 25 objective questions, which served as pre-test and post-test. As pre-test, was to ascertain equivalence ability of students and as post-test, was to determine the effectiveness of the treatment on students' achievement in Basic Science. The test items were drawn from Junior School Certificate Examination (JSCE) conducted by National Examination Council (NECO).

Students' Attitude Questionnaire toward the learning Basic Science (SAQ)

- This also consisted of two sections. Section A of it contains respondents' bio-data while section B has ten items/statements that were constructed on a Likert Pattern from Strongly Agree (SA), Agree (A), Strongly Disagree (SD) and Disagree (D).

Validity and Reliability of the Instruments

The two instruments were given to experts in psychology and evaluation departments for their comments on content validity and relevance of sentence structure and their corrections were used to prepare the final drafts used for pilot test and their reliability coefficient (r) yielded 0.84 and 0.78 respectively using Cronbach alpha correlation coefficient. The two instruments were used for data collection for the study.

Procedure for Data Collection

The researcher visited the schools used for the study, sought the permission from the school authorities to use their schools and students for the study. The permission of the Basic Science teachers in the schools was also sought for, so that the selected sample students in their JSSII intact classes were given the pre-test before the commencement of the treatment in order to know their entry level during the first week of the study. The study lasted for five

weeks. After the treatment, subjects were post-tested to determine their level of achievements in the topics covered so as to find out the effect of the learning strategies.

The questionnaire on students' attitude towards the strategy was also administered after the post-test. The topics taught in the schools during the study are energy, force, matter, pollution and diseases.

Method of Data Analysis

Data collected were analyzed using mean, standard deviation and t-test analysis.

Results

The results of the data collected for the study are presented below from one hypothesis to the other. The discussion of the findings then follows

Hypothesis One: There is no significant difference in the performance of students exposed to cooperative learning strategy and those taught using the traditional classroom teaching method.

In order to test this hypothesis, the post-test mean scores of the students in the two groups (CLS and TEM) were subjected to the t-test analysis and the result is as presented in Table 1 below.

Table 1: t-test analysis of the achievement test scores of students taught with Cooperative Learning Strategy (CLS) and those exposed to Teacher Expository Method (TEM) in Basic Science.

Strategies	N	Mean	Standard Deviation	Df	T	Sig. (2-tailed)	Remark
CLS	30	17.07	3.56	58	4.643	.000 $p < 0.05$	Significant
TEM	30	12.73	3.67				

($t = 4.643, p < 0.05$)

Inferentially, results in Table 1 shows that there is significant difference in the achievement test scores of students taught with Cooperative Learning Strategy (CLS) and those exposed to Teacher Expository Method (TEM) at ($t = 4.643; p < 0.05$) in Basic Science within the study area. Hence, the null hypothesis that states that there is no significance difference in the performance of students exposed to cooperative learning strategy and those taught using the traditional classroom teaching method in Basic Science is hereby rejected. This result implies that those students taught with Cooperative Learning Strategy (CLS) with a

mean score of ($\bar{x} = 17.07$) performed better than their colleagues in Teacher Expository Method (TEM) with a mean score of ($\bar{x} = 12.73$) and that students should always be taught with Cooperative Learning Strategy (CLS) in Basic Science.

Hypothesis Two: There is no significant difference in the attitude of students exposed to cooperative learning strategy before and after the treatment.

In order to test this hypothesis, the pre-attitudinal and post-attitudinal mean scores of the students that were exposed to Cooperative Learning Strategy (CLS) were also subjected to paired sample t-test analysis and the results were presented in Table 2 below.

Table 2: Paired sample t-test analysis of the attitudes of students exposed to Cooperative Learning Strategy (CLS) towards Basic Science.

	Attitudes	N	Mean	Standard Deviation	T	Sig. (2-tailed)	Remark
CLS	Pre-attitude	30	21.03	5.73	41.040	.000 p<0.05	Significant
	Post-attitude	30	31.33	3.68			

(t = 41.040, p<0.05)

Results in Table 2 revealed that there is a significant difference in the attitudes of students exposed to Cooperative Learning Strategy (CLS) before and after treatment towards Basic Science at (t = 41.040; p<0.05). Therefore, the null hypothesis that states that there is no significant difference in the attitude of students exposed to Cooperative Learning Strategy (CLS) after treatment is hereby rejected. The results showed that after the treatment, students developed

better attitude towards the use of cooperative learning strategy in learning Basic Science.

Hypothesis Three: There is no significant difference in the performance of male and female students exposed to cooperative learning strategy in Basic Science.

In order to test this hypothesis, the post-test mean scores of male and female students exposed to Cooperative Learning Strategy (CLS) were subjected to t-test analysis and the result is as presented in Table 3 below.

Table 3: t-test analysis of the achievement test scores of male and female students exposed to Cooperative Learning Strategy (CLS) in Basic Science.

	Sex	N	Mean	Standard Deviation	T	df	Sig. (2-tailed)	Remark
Achievement Test Scores	Male	12	17.67	4.49	0.748	28	.222 p>0.05	Not Significant
	Female	18	16.67	2.85				

(t = 0.748, p>0.05)

Results in Table 3 indicated that there is no significant difference in the achievement test scores of male and female students exposed to Cooperative Learning Strategy (CLS) in Basic Science at (t = 0.748, p>0.05). Thus, the null hypothesis that states that there is no significant difference in the achievement test scores of male and female students exposed to Cooperative Learning Strategy (CLS) in Basic Science is hereby upheld. This result shows that sex is not a predictor of academic performance of students in the subject within the study area.

Discussion of Findings

The results of the study showed that there is significant difference in the performance of students exposed to Cooperative Learning Strategy (CLS) and those taught with Teacher Expository Method (TEM) in Basic Science. This result corroborates with the findings of Johnson and Johnson (2009) when they found out that cooperative learning strategy, if

effectively utilised in the classroom, can help low ability students improve in their performance i.e those who had difficulties making success in the traditional classroom settings.

The results of the study further revealed that there is significant difference in the attitude of students exposed to Cooperative Learning Strategy (CLS) after the treatment towards Basic Science. This result supports the findings of Fencl and Scheel (2005) when they discovered that the method heightens students' interest and encourages positive attitude and feeling towards the teaching of science. In addition, research by Johnson and Johnson (2009) on learning together and alone showed that cooperative learning enhanced more positive attitude towards subject members and the teacher.

Finally, results of the study indicated that there is no significant difference in the performance of male and female students exposed to Cooperative Learning Strategy (CLS) in Basic Science which is in

agreement with Gilles and Adrian (2003) who found out that cooperative learning equalize the status and engender respect for all group members, regardless of gender. In addition, studies by Johnson and Johnson (1989), Bransford, Brown and Cocking (1999) and Johnson (2003) found out that cooperative learning gains are not limited to a particular ability level or sex but to all who engage in it.

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