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Effect of Cooperative teaching Method on Students' Academic Achievement in Basic Technology in Federal Government Colleges in Lagos State, Nigeria

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Abstract. This study was designed to investigate the effect of cooperative learning methods on students' academic achievement in basic technology in federal government colleges in Lagos state, Nigeria. Two purposes of the study were determined. Two research questions guided the study, while two null hypotheses were formulated and tested at 0.05 level of significant. The study employed a Quasi-experimental research design where pre and post-tests and non-equivalent groups were used in intact classes in order not to disrupt the smooth running of the classes as planned by the school authority. The sample used for the study was 123 Junior Secondary III students. The study used two intact classes where one of the schools served as experimental group, and the other one was used as control group. forty (40) multiple choice test items were developed and validated by three experts in the Department of Vocational and Technical Education, University of Benin, Benin City. The two intact classes were taught 4 topics in basic technology for a period of six weeks. Cooperative learning was used for teaching the experimental group while conventional method was used for the control group. Data collected after the treatment was analyzed using means and standard deviations to answer the research questions while t-test was used to test the hypotheses at 0.05 level of significance. From the data collected, it was found that students who were exposed to cooperative teaching performed better and had more knowledge of the subject than those who were taught using conventional teaching method. However, the results of the hypotheses tests revealed that the differences in the mean achievement scores of the two groups were significant. Hence, the study recommends that teachers should be adequately trained in the process of employing cooperative learning strategies for the effective teaching of basic technology in federal government colleges in Lagos State.

Keywords: Cooperative learning method, Academic achievement, Basic technology

1. Introduction

Technology based subject are now part of the secondary school curriculum in Nigeria. Technology according to Waziri (2005) is the use of the product of creativity, inventions and scientific research in the service of man. Miller, Bakare and Ikatule (2010) described technology as the process by which humans modify nature to meet their needs and wants. Years back, the teaching of technology and related subjects was not made a major focus at the lower level of Nigerian educational system most especially at secondary school level. To address the lapses, the Federal Ministry of Education brought about the former 6-3-3-4 system that introduced the teaching of the subject called introductory technology also known as intro-tech in junior secondary schools in Nigeria.

Basic technology is a foundational subject on which future technological awareness of students are built for those interested in vocational technical courses or engineering courses at the tertiary institutions. According to the Report of Federal Ministry of Education (2007), basic technology is a core subject in the nine (9) years basic education programme. Its purpose according to the report is to contribute to the achievement of the national education goals by inculcating technology literacy, exposure of students to the world of work to match their talents and interests for wise vocational choice and inculcation of positive attitudes towards work as a source of human identity, livelihood and power. Basic technology therefore, is a subject taught in the junior secondary school with the incorporation of many skilled subjects such as woodwork, metal work,

electrical/electronics, mechanics, technical drawing and local crafts to enable students of that school age be abreast with basic technological skills and competencies for useful living in the society (Otamba, 2013). Basic technology before now known as introductory technology was structured to assist learners to develop interest in technology. The aim is that at the end of junior secondary school, technological appreciation would have been attained and solid foundation laid for students' entrance into a vocation of their choice. This is in consonance with the statement in the National Curriculum for Junior Secondary Schools (1998). Amongst others, it states that in order to reduce ignorance about technology, a solid foundation should be laid for national development and for increase in skill acquisition and academic achievement.

Academic achievement or performance is the outcome of appropriate teaching method in an education setting. It indicates the extent to which a student, teacher or institution has achieved their educational goals. However, students' academic achievement in basic technology is a reflection of the extent to which the learners have acquired the intended knowledge and skills. Despite the importance of basic technology to the individuals and national development, over the years the academic achievement of junior secondary school students (JSS3) in basic technology is far from impressive. Basic Education Certificate Examination (BECE), under the supervision of National Examinations Council (NECO), the students' mean scores in the subject have been less than or around fifty percent 50% for the years 2013-2017 as shown in Table 1

Table 1: Student's Academic Performance in Basic-Technology (2013-2017) in Lagos State.

School	Year	2013	2014	2015	2016	2017
FGC, Ijanikin,	Enrolment	47	44	53	55	59
	%Pass	33%	36%	39%	42%	45%
FSTC, Yaba,	%Fail	67%	64%	61%	58%	55%
	Enrolment	58	55	59	60	63
KC,	%Pass	36%	39%	42%	45%	48%
Vic Island	%Fail	64%	61%	58%	55%	52%
	Enrolment	68	63	64	67	70
QC,	%Pass	38%	40%	39%	43%	46%
Yaba	%Fail	62%	60%	61%	57%	54%
	Enrolment	40	43	48	42	46
	%Pass	26%	29%	32%	35%	38%
	%Fail	74%	71%	68%	65%	62%

Source: *Office of the Principal of Various Colleges*

The poor performance could be attributed to the use of the conventional instructional approach that do not promote knowledge retention and acquisition of practical skills. It only focuses completely on the intellectual and neglects the experiential learning (Salako, Eze, & Adu, 2013). Previous studies argued that the quality of teachers' instructional approach is a key determinant of students' achievement (Adeyemi, 2002; Bilesanmi-Awoderu, 2006). Furthermore, the consistent failure recorded among junior secondary school students in national examinations could be due to the conventional instructional approach employed by the teachers (Afolabi & Akinbobola, 2009; Aremu & Sokan, 2003; Ezeagba, 2014) (Akanbi & Kolawole, 2014; Mohammed, 2011). The researcher is worry that if basic technology teachers continue to use conventional instructional approaches, students may not acquire the needed knowledge and skills that would enable them to improve on their academic performance and excel in their further studies in technology. Therefore, the researcher wish to employ the student centre approach such as co-operative learning if it will improve on students' performance in basic technology in line with this ministry of education has advised the Basic Technology teachers to make use of instructional approach that encourage understanding and retention of the content taught. According to Kibett (2002), good instructional approach should provide the learners with information to be used now or in the future as well as guide learners to tackle problems. Example of such approach is co-operation teaching.

Co-operative teaching Approach (CLA) is an instructional approach that is learner-centered. This approach has an interactive nature of learning which enables the learners to take a more active role in the learning process, take responsibility for their work, be highly effective and develop cognitive skills, and provide enjoyment to the learner (Dembo, 1994). A co-operative teaching approach (CLA) is an instructional approach in which learners work in small learning groups to address the problems and

other learning objectives while the teacher acts as a facilitator (Duplass, 2005). It is the approach that allows students to work together to attain their learning objectives (Abrami, Poulsen, & Chambers, 2004).

This study therefore set out to find the effect of cooperative learning Method on Students' Academic Achievement in Basic Technology in Federal Government Colleges in Lagos State, Nigeria

2. Purpose of the Study

The main purpose of this study ascertained the effect cooperative teaching method on students' academic achievement in Basic Technology in Federal Government College, Lagos State. Specifically the study determined:

- The effective of co-operative teaching method and conventional teaching method on students' academic achievement in basic technology in lagos state
- The effective of cooperative teaching method on male and female students' academic achievement in basic technology in lag

3. Research Questions

Two research questions guided the study:

- What is the difference in the mean achievement scores of students taught basic technology with cooperative teaching methods and those taught with conventional teaching method?
- What is the difference in the mean achievement score of male and female students taught basic technology using cooperative teaching methods?

4. Hypotheses

Two null hypotheses were tested at 0.05 level of significance.

- There is no significant difference between the mean achievement scores of students taught basic technology with cooperative teaching method and those taught using conventional method.
- There is no significant difference between the mean achievement scores of male and female students taught basic technology using cooperative teaching method.

5. Methodology

This study employed Quasi-experimental design of non-equivalent groups pre-test, post-test design (Campbell & Stanley, 1963). Subjects were not randomly assigned to groups rather, intact classes were used in order not to disrupt the smooth running of the classes as planned by the school authority. The total number of students in both groups was one hundred and twenty three (123). One school was assigned as the experimental group, Federal Government College, Ijanikin Lagos with the total of fifty seven (57) students which consisted thirty five (35) male and twenty two (22) female while the other school was assigned as the control group, Federal Science and Technical College, Yaba Lagos with the total of sixty six (66) students which also consisted forty one (41) male and twenty five (25) female.

Four topics from basic technology were selected and taught for a period of six weeks in the two schools. The experimental group was taught using cooperative teaching method while the control group was taught using the conventional method.

The instruments used for data collection in this study was the Basic Technology Achievement Test (BTAT) which contained forty (40) multiple choice test items. Before the treatment, a pre-test was administered to the two groups (experimental and control). After the treatment a post-test was then administered to the two groups to ascertain the effect of the methods on the groups. The instrument (BTAT) was developed by the researcher based on the topics that the students were taught. The instrument was validated by lecturers in the department of Vocational and Technical Education, University of Benin, Benin. And it complied with the table of specifications.

The instrument BTAT was administered to 20 JSS3 basic technology students drawn from Federal Government College, Odoogbolu Ogun State who were not part of the sample. The reliability of the instrument was established using Kuder-Richardson Formular. Kuder-Richardson 20 is very appropriate for determining the degree of reliability of standard test which deals with dichotomous score where items are scored "1" (right) or "0" (wrong) (Uzoagulu 2011).The test yielded a reliability coefficient of 0.78. Mean $(\bar{X})$ was used to analyze data and provide answers to the research questions raised using mean differences while t-test was used to test the hypothesis formulated for this study at 0.05 level of significance.

6. Presentation of Results

Research Question 1: What is the difference in the mean achievement scores of students taught basic technology with cooperative teaching method and those taught with conventional teaching method?

Table 2: Mean ($\bar{X}$) and standard deviation of the experimental (Cooperative teaching method) and Control (Conventional method) groups Scores

Variable	N	Pre test		Post test		Mean diff.	Decision
		Mean	SD	Mean	SD		
Experimental group	57	18.73	4.61	30.53	3.397	07.27	Effective
Control group	66	17.88	4.31	23.26	5.037		

Source: *Field Survey, 2019*

Results in *Table 2* shows that the mean test scores of the 57 students in the cooperative learning group was 30.53 with standard deviation of 3.397while the mean test scores of the 66 students in the conventional group was 23.26 with standard deviation of 5.037. The mean difference was 07.27 in favour of the cooperative learning group. This implies that the scores of the students taught with the cooperative learning method was higher than those taught with the conventional method. This high mean difference therefore implies that the cooperative learning method was more effective in teaching basic science to students than the conventional method.

Hypothesis 1: There is no significant difference between the mean achievement scores of students taught basic technology with cooperative teaching method and those taught using conventional method.

Table 3: Independent samples t-test of cooperative learning method and conventional teaching method.

Teaching method	N	Mean	SD	Df	t-value	p-value	Remark
Cooperative learning	57	30.53	3.397	117	9.147	0.000	Significant
conventional method	62	23.26	5.037				

Source: *Field Survey, 2019*

The result of the independent samples t-test in *Table 3* revalued, that the mean score of students in the cooperative teaching group was 30.53 with standard deviation of 3.397 while that of the conventional group was 23.26 with standard deviation of 5.037. The t-value is 9.147while the p-value is 0.000 at degree of freedom 117. Since the p-value is less than $\alpha = 0.05$, the null hypothesis was rejected. This means that there is a significant difference between the mean achievement scores of students taught basic technology with cooperative learning method and those taught using conventional method.

Research Question 2: What is the difference in the mean achievement score of male and female students taught basic technology using cooperative teaching methods?

Table 4: Means ($\bar{X}$) and standard deviation of the male and female students taught basic technology with Cooperative learning Group

Gender	N	Pre test		Post test		Difference	Decision
		Mean	SD	Mean			
Male	35	19.81	5.12	30.54	10.75		More Effective
Female diffrence	22	15.48	2.32	30.50	15.02	`	
					4.27		

Source: Field Survey, 2019

Table 4: reveal that the difference in the pre- test and post- test mean scores of male students is 10.75 while that of the female students is 10.02. The difference between the mean scores of male and female students is 4.27 in favour of the female students it means that the use of cooperative teaching method in teaching basic technology is more effective on female students academic achievement.

Hypothesis 2: There is no significant difference between the mean achievement scores of male and female students taught basic technology using cooperative teaching method.

Table 5: Independent samples t-test of male and female students taught with the cooperative learning method.

Gender	N	Mean	SD	Df	t-value	p-value	Remark
Male	35	30.54	3.184	55	0.046	0.964	Not Significant
Female	22	30.50	3.789				

Source: *Field Survey, 2019*

The result of the independent samples t-test in *Table 5* shows that the mean and standard deviation of male students in the cooperative learning group was 30.54 and 3.184 respectively while that of the female students was 30.50 with standard deviation of 3.789. The t-value is 0.046 while the p-value is 0.964 at degree of freedom 55. Since the p-value is greater than $\alpha = 0.05$, the null hypothesis is accepted. This means that there is no significant difference between the mean achievement score of male and female students taught basic technology using cooperative learning method.

7. Discussion of Findings

From the results of this study, the following major findings were made.

Students in the experimental group (cooperative teaching) performed better than students in the control (conventional method) group as they recorded significantly higher scores ($p > 0.05$) than the students in the control group.

Male and female students had an almost equivalent performance in the post-test after administering cooperative learning strategies and the difference in their scores was not significantly different.

In line with major findings one, it has further reinforced the idea that cooperative learning has significant effect on students' performance in basic technology in federal government colleges in Lagos State and their attitudes towards the subject. The experimental group showed significant improvement in their average scores in comparison to the control group. The results therefore suggest that the increase of the students achievement scores in basic technology was to a large extent due to the application of cooperative learning strategies. The findings of this study are therefore consistent with the results as reported by Hossain and Rohani (2013), Effiandi (2003), Whicker et al (1997) and Vaughan (2002). The findings of this study also corroborates the studies carried out by Johnson and Johnson (1994), Davidson (1990), Faizah (1999), Ozsoy and Yildiz (2004) and Zakaria et al. (2010). The core ingredient of cooperative learning is that students work in a group, trying to achieve shared targets, thus adding value to the success of the group. This component helps students in many other ways. For example, in improving their self -concept, self-confidence (Zakaria, Daud and Abidin, 2013), polishing social skills and increased classroom participation. However, the findings of cooperative learning leading to significant positive outcomes of students in subjects is in contrast to the reports made by Ismail (2000) who found no significant differences in attitudes towards mathematics between experimental and control groups. The short treatment period of three and half weeks might be the possible reason for no significant differences between the groups as recorded in that study.

In line with major findings two, the study went further to compare the achievement of boys and girls in the experimental group after the administration of cooperative learning strategies. It was found that the mean achievement between boys and girls in the experimental group were similar and thus had no significant difference. This shows that cooperative learning is both effective for boys and girls and has no gender bias in its effectiveness. Thus when cooperative learning strategies are employed in both boys and girls schools, it will lead to positive outcomes in improving their learning and retaining ability.

8. Conclusion

With the objective set out in this study and the research methodology that was employed in arriving at the findings, it is clear that cooperative learning helped to improve the learning outcomes of students irrespective of gender. It was discovered that students were motivated to learn when learning was more of knowledge sharing session than when it is competitive. They felt more comfortable working in groups with a common goal and being confident to ask questions and make their input without fear of ridicule or embarrassment. From this study, therefore, it can be wholly adjudged that cooperative learning is a veritable and effective learning tool which should be employed as a means of improving the performance of students in basic technology in unity schools in Lagos State.

9. Recommendations

The following recommendations based on the findings were made:

- Teachers should be adequately trained in the process of employing cooperative learning strategies in the classroom.
- Students should be encouraged and motivated to learn by taking into cognizance their unique learning abilities and these should be harnessed effectively for improved outcomes.
- Policy makers and teachers should identify appropriate measures that can promote cooperative learning in the classroom

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