

## EFFECTS OF COOPERATIVE LEARNING ON STUDENTS' ACADEMIC ACHIEVEMENT AND RETENTION IN BLOCKLAYING, BRICKLAYING AND CONCRETING WORK IN TECHNICAL COLLEGE IN NIGER STATE

N. U. Alhassan<sup>1</sup>, K. A. Mohammed<sup>2</sup> and A. M. Hassan<sup>3,\*</sup>

<sup>1</sup>*School of Technical Education, Niger State College of Education, Minna*

<sup>2</sup>*Department of Building Technology, Niger State Polytechnic, Zungeru*

<sup>3</sup>*School of Science and Technology Education, Federal University of Technology, Minna*

\*Corresponding E-mail: [yabhass@yahoo.com](mailto:yabhass@yahoo.com) (Tel: +2348035872654)

**Abstract:**-This study was carried out to consider the effect of cooperative learning on students' academic achievement and retention in Blocklaying, Bricklaying and Concreting work in Technical Colleges of Niger state, Nigeria. Four (4) research questions and four (4) hypotheses were formulated to guide the study. The study was carried out in four (4) Technical Colleges in Niger State, the instrument that was used for data collection was Blocklaying, Bricklaying and Concreting achievement test (BBCAT) consisting of forty (40) multiple-choice items. The population of the study was sixty (60) comprising of all TC II Blocklaying, Bricklaying and Concreting students. Data analysis was done using mean and standard deviation, while Null hypothesis were tested using Analysis of covariance (ANCOVA). The study finds out that Cooperative learning (STAD) method is more effective than the conventional lecture method on student Academic Achievement in Blocklaying, Bricklaying and Concreting work and also students taught Blocklaying, Bricklaying and Concreting work with Cooperative learning (STAD) method have higher retention as compared with those taught with conventional lecture method among others. Consequently, it was recommended among others that refresher course on should be organized for teachers and educational administrators at all tiers of government.

**Keyword:**-Cooperative learning, Students, Blocklaying, Bricklaying, Concrete Works

### Introduction

Building Trade is one of the major academic programmes in Technical Colleges in Nigeria. Blocklaying, Bricklaying and Concreting (BBC) as a vocational programme is aimed at producing technicians who will be able to perform basic functions in Building Technology practice both in the private and public sectors. Technical and Vocational Education is a comprehensive term referring to those aspects of educational process involving, in addition to general education, the study of technologies and related sciences and acquisition of practical skills, attitude, understanding and knowledge relating to occupations in various sectors of economic and social life. Ali (2009) concluded that this observed deterioration in students' achievement in Blocklaying, Bricklaying and Concreting must have been contributed by the methods of teaching building trades to students. Building trades teachers have the professional responsibility of helping to maintain and develop interest in the teaching of Blocklaying, Bricklaying and Concreting and making their teaching more practical oriented. Unfortunately, many Blocklaying, Bricklaying and Concreting teachers adopt teaching methods where auricular activities rely heavily on textbooks. Students are seen as 'blank slates' into which information is etched by the teacher. In such methods the teacher is more interested in seeking the correct answer to validate students' learning. Students in this case, struggle to understand concepts in isolation and learn parts without seeking wholes thereby making connections where they see disparity and accept as reality what their perceptions question. Success for many students has much to do with the coverage of the curriculum and very little with the understanding. Teachers are made to follow the curriculum rigidly even when it is clear that students did not understand important concepts in Blocklaying, Bricklaying and Concreting.

Cooperative learning is a successful teaching strategy in which small teams, each with different levels of ability, use a variety of learning activities to improve their understanding of a subject David and Johnson, (2001) and Blair (2003), cooperative learning is a teaching method that involves heterogeneous group working together on tasks that are deliberately structured to provide

specific assignment and individual contributions. Johnson and Holubec (2003) on their own view defined Cooperative learning as an instructional use of small groups so that students work together to maximize their own and each other's learning. Student Teams-Achievement Division (STAD) method developed by Slavin (2010) consists of group of three or four students of mixed performance level. Students are heterogeneously grouped by ability, gender, race, and ethnicity. It involves competition among groups. The teacher presents the lesson and all the students work cooperatively in their teams to ensure that all the team members master the content of the lesson. All the students then take quizzes as individuals. Individual scores are summed up to form the group score. The points contributed to the group are based on a student's improvement over previous quiz performance Slavin considered this method appropriate for a variety of subjects, including science and technology. Specifically, instruction in STAD organized around the four stages of lesson planning: teaching; team study; individual quizzes; team recognition.

Academic achievement connotes performance in school subject as symbolized by a score on an achievement test. Epunnah (2010) defined Achievement as the learning outcome of students which include the knowledge, skills and ideas acquired and retained through their course of studies within and outside the classroom situation. Academic achievement in BBC is the quality and level of skills acquired and retained by students. Mbah (2002) remarked that achievement is dependent upon several factors among which are instructional techniques, the learning environment, motivation for stimulating students' interest in learning and the learners. Therefore, the academic achievement of students in BBC also depends on the interest of the students in the subject. However, students are able to retain acquired knowledge if they grasped what has been delivered by the teacher. Retention is the ability to reproduce the learnt concept when the need arises Deirel (2004), However, students interest and retention could be aroused and retained through the use of an appropriate teaching strategies. Gender has been identified as one of the factors influencing students interest and achievement in BBC (Howden, 2008). The issue of gender has assumed prominence in technical and vocational education discourse. Gender is a sense of awareness of being male or female. It is a behavioural pattern and attitude perceived as masculine or feminine within a culture (Ogunbowale, 2007). The teacher is mainly faced with the task of how to help students improve on their ability to assimilate information. BBC concepts we know cannot be learnt properly by mere memorization through rote learning, this why this study uses Cooperative learning to ascertain student's achievement and retention in BBC in Technical Colleges.

### Statement of the problem

Research evidences from studies on students' academic achievement in Blocklaying, Bricklaying and concreting suggest that the state of Blocklaying, Bricklaying and Concreting in Nigeria is largely unsatisfactory. This state of affairs in BBC is disturbing. Research in BBC on students' conception shows that students experience difficulties in learning BBC. These learning difficulties may be as a result of the differences between the meaning constructed by the learner and certain aspects of Blocklaying, Bricklaying and Concreting knowledge. This implies that the existence of preconception among the technical college BBC students could be regarded as one of the major reasons for low academic performance in technology and BBC in particular. Other factors like ineffective instructional strategies adopted by Nigerian building trades teachers which seem to ignore alternative conception/preconception some students have on Blocklaying, Bricklaying and Concreting contents to be learned before a formal instruction takes place have been implicated.

### Research questions

1. What is the effect of Cooperative learning (STAD) method on students' academic achievement in Blocklaying, Bricklaying and Concreting work?
2. What is the effect of Cooperative learning (STAD) method on students' retention in Blocklaying, Bricklaying and Concreting Work?
3. What is the influence of gender (STAD) method on students' academic achievement in BBC Work?

#### 4. What is the influence of gender (STAD) method on students Retention in Blocklaying, Bricklaying and Concreting?

##### Hypotheses

- H<sub>01</sub>:** There is no significant difference in the mean achievement scores of students taught Blocklaying, Bricklaying and concrete work using Cooperative learning (STAD) method and those taught with Conventional lecture method.
- H<sub>02</sub>:** There is no significant difference in the mean Retention scores of student taught BBC Work with Cooperative learning (STAD) method and those taught with Conventional lecture method.
- H<sub>03</sub>:** There is no significant difference in the mean achievement scores of male and female students taught BBC Work with Cooperative learning (STAD) method.
- H<sub>04</sub>:** There is no significant difference in the Mean Retention scores of Male and Female students taught BBC Work with Cooperative learning (STAD) method.

##### Methodology

A quasi experimental design was used for the study. The study was carried out in Niger state. The population of the study comprises of 151 TC II students of BBC in the four technical Colleges in Niger State that were used for the study. The four accredited technical colleges were purposively sampled for the study. The number of students in Building trade were all used No sampling was carried out. The instrument that was used for data collection is Blocklaying, Bricklaying and Concreting Achievement Test (BBCAT) consisting of 40 multiple-choice items developed by the researcher. The BBCAT was subjected to both face and content validation it was sent to three experts in the Department of Industrial and Technology Education of Federal University of Technology Minna, The BBCAT instrument was administered to 40 students of Federal Science Technical College Shiroro Kuta not used for the study. The instrument was scored and rated. The reliability coefficient of the BBCAT using Kuder Richardson Formula 20(RR-20) was determined. The reliability coefficient yielded 0.86, the instrument was then adopted for the study. Four sampled classes were pre-tested using BBCAT test before treatment commenced. The pretest established initial group equivalent. Two classes were taught with Cooperative learning this group were the experimental group. The control group made up of two classes were taught using conventional method, the teaching lasted for five weeks. The instrument was administered by the researcher and the research assistance who are BBC teachers in the schools involved in the study. Mean and standard deviations were used to answer the four research questions. Analysis of covariance (ANCOVA) was used for testing the stated hypotheses at 0.05 level of significance.

##### Results

**Table 1: Mean and Standard Deviation of Pre-Test and Post-Test Scores of Experimental and Control Groups in the Academic Achievement Test**

Students	N	Pre-Test		Post-Test		Mean Gain
		Mean	SD	Mean	SD	
Experimental Group	80	13.53	3.64	19.14	3.55	5.61
Control Group	71	12.93	4.65	13.86	4.54	0.93

Table 1 showed that the students in the experimental group obtained mean scores of 13.53 in the pretest and 19.14 in the posttest with respective standard deviations of 3.64 and 3.55. The control group students obtained mean scores of 12.93 and 13.86 in the pretest and posttests respectively. Their respective standard deviations were 4.65 and 4.54. The table shows that the experimental group had a higher mean score, than the control group in the post- test.

**Table 2: One Way Analysis of covariance (ANCOVA) Results of Students' Achievement in Blocklaying Bricklaying and Concreting in Experimental and Control Groups**

Source of Variation	Sum of Squares	df	Mean Square	F-cal	F-tab	Dec
Covariance	269.9476	1	269.9476	1.24	3.89	NS
Main affect	917.0862	1	917.0862	4.22	3.89	S
Method	917.0862	1	917.0862	4.22	3.89	S
Explained	1208.8294	2	604.4147			
Residual	5150.4603	148	217.3190			
<b>Total</b>	<b>6359.2897</b>	<b>151</b>				

Table 2 shows that for covariate, the F-cal (1.24) was less than the F-tab (3.89) Hence, covariate is not significant. For the method of teaching, the F calculated (F cal) value of 4.22 is greater than the F-table value of 3.89. Hence, there is a significance differences between the mean achievement scores of students taught Blocklaying, Bricklaying and Concreting using Cooperative learning method, and those taught Blocklaying, Bricklaying and concreting using the lecture method.

**Table 3: Mean and Standard Deviation of Pre-Test and Post-Test Scores of Experimental and Control Groups in the Retention in Blocklaying, Bricklaying and Concreting Work**

Students	N	Pre-Test		Post-Test		Mean Gain
		Mean	SD	Mean	SD	
Experimental Group	80	84.11	12.99	106.85	10.23	22.74
Control Group	71	86.49	14.48	90.12	13.65	3.63

Table 3; showed that the experimental group of students taught with Cooperative learning method had a mean score of 84.11 in the pretest retention scale questionnaire and 106.85 in the post retention scale questionnaire. They had respective standard deviation of 12.99 and 10.23. The control group taught with lecture method had 86.49 in the retention scale questionnaire and 90.12 in the post retention scale questionnaire. The posttest scores show that the experimental students obtained a higher mean score than the control group students.

**Table 4: One-Way Analysis of Covariance (ANCOVA) Result of Students' Mean Retention Scores in the Experimental and Control Group**

Source of Variation	Sum of Squares	df	Mean Square	F-cal	F-tab	Dec
Covariance	222.5011	1	22.5011	2.89	3.89	NS
Main affect	503.3280	1	503.3280	7.20	3.89	S
Method	503.3280	1	503.3280	7.20	3.89	S
Explained	553.9828	2	2766.9914			
Residual	18246.6300	148	76.9900			
<b>Total</b>	<b>188006.128</b>	<b>151</b>				

Table 4 showed that the covariate, the F-calculated value of 2.89 is less than the F-table value of 3.89. Hence, covariate is not significant. For method of teaching, the F-calculated value of 7.20 is greater than F-table value of 3.89, so the null hypothesis is rejected. Therefore, there is significance conventional lecture method in an achievement test.

**Table 5: Mean and Standard Deviation of Pre-Test and Post-Test of Male and Female Students Taught Blocklaying, Bricklaying and Concreting Work Using Cooperative Learning Method**

Sex	N	Pre-Test		Post-Test		Mean Difference
		Mean	SD	Mean	SD	
Male	47	10.42	3.26	11.24	3.48	0.82
Female	33	9.83	3.89	10.96	4.00	1.13

Table 5 showed that the male in the experimental group had a mean achievement scores of 10.42 and 11.24 in the pretest and posttest with corresponding standard deviations of 3.26 and 3.48 respectively. The female obtained mean achievement scores of 9.83 and 10.96 in the pretest and posttest with corresponding standard deviations of 3.89 and 4.06 respectively. The table showed that the female in the experimental group had a higher mean achievement scores than the male taught with the same Cooperative learning method.

**Table 6: One Way ANCOVA Results of Male and Female Students Taught Blocklaying, Bricklaying and Concreting Work Using Cooperative Learning Method**

Source of Variation	Sum of Squares	df	Mean Square	F-cal	F-tab	Dec
Covariance	138.5859	1	138.5859	2.22	3.89	NS
Main affect	66.1717	1	66.1717	1.06	3.89	NS
Method	66.1717	1	66.1717	1.06	3.89	NS
Explained	249.8416	2	124.9208			
Residual	14794.9857	148	62.4261			
<b>Total</b>	<b>15044.8273</b>	<b>151</b>				

Table 6 showed that for the covariate pretest, the  $F$  calculated value of 2.22 is less than T-table value of 3.89. Hence, covariate is not significant. For the method the  $F$  calculated value of 1.06 is less than T-table value of 3.89, so the null hypothesis is accepted. Therefore, there is no significant difference between the mean score of male and female taught Blocklaying Bricklaying and Concreting using Cooperative learning method.

**Table 7: Mean Retention Scores and Standard Deviations of Male and Female Students Taught Blocklaying, Bricklaying and Concreting Using Cooperative Learning Method**

Sex	N	Pre-Test		Post-Test		Mean Difference
		Mean	SD	Mean	SD	
Male	47	89.42	18.61	103.40	15.89	12.68
Female	33	78.80	22.43	110.30	18.66	31.50

Table 7; showed that the males in the experimental group obtained a mean retention scores of 89.42 and 103.10 respectively with standard deviations of 18.61 and 15.89. The females had mean retention scores of 78.80 and 110.30 respectively in the pre and post-retention scale with respect standard deviation of 22.43 and 18.66. The post retention scores revealed that the girls had a higher retention scores than the boys in the same experimental group.

**Table 8: One Way ANCOVA Results of Males and Female Students' Retention Scores in the Experimental Group**

Source of Variation	Sum of Squares	df	Mean Square	F-cal	F-tab	Dec
Covariance	221.4101	1	221.4101	3.99	3.89	S
Main affect	223.6354	1	223.6354	4.01	3.89	S
Method	223.6354	1	223.6354	4.01	3.89	S
Explained	447.2508	2				
Residual	26368.9518	148				
<b>Total</b>	<b>26816.2026</b>	<b>151</b>				

Table 8; showed that for the covariate, the F-calculated value of 3.99 is greater than the F-table value of 3.89. Hence, covariate is significant for gender; F-calculated value of 4.01 is greater than F-table value of 3.89. So the null hypothesis was rejected. Therefore, there is a significance difference between the mean retention scores of male and female taught Blocklaying, Bricklaying and concreting using Cooperative learning method.

#### Findings of the study

1. Cooperative learning (STAD) method is effective than the conventional lecture method on students' achievement in BBC work.
2. Students taught BBC work with Cooperative learning (STAD) method have higher retention as comprised with those taught with conventional lecture method.
3. It was found out that there is an effect of gender on the achievement of student taught BBC work in favour of female students

#### Discussion of the findings

1. *Effect of Cooperative Student Team Achievement Division Method (STAD) on Students' Academic Achievement in Blocklaying Bricklaying and Concreting Work:* Findings on Bricklaying and Concreting in the Table 1 showed that the student s in the Experimental group obtain Mean score of 13.53 in the pre-test and 19.14 in the post-test with respective standard deviation of 3.64 and 3.55. The control group Students obtained mean scores of 12.93 and 13.86 in the Pre-test and Post-test respectively. At the same time. Analysis of Covariance was used to test the first hypotheses. Table 2 at the calculated F-Cal (1.2) was less than the F-table (3.89) for the method of teaching, the F-cal value of 4.22 is greater than the F-table value of 3.89. Hence there is significance differences between the Mean achievement scores Students taught BBC using Cooperative learning method than those taught BBC using lecture method. This is in line with what David and Johnson (2001) states that Cooperative learning is a successful teaching strategy in which small teams each with different level of ability, used a variety of learning activities to improve their understanding. They further states that Cooperative learning is a teaching method that involve generally heterogeneous group working together on task that are deliberately structured to provide specific assignment and individual contributions. In learning, providing opportunities to interest with course material through the use of cooperative skills tends to change the course from teacher centered approach to one that is more student centered, and focused on the cognitive development and construction of knowledge is to create meaning by doing and interacting Blair (2003) Argued that students can learn to think better if school concentrate on teaching how to do so, through the use of appropriate instructional techniques and promote intellectual growth and fosters academic performance gains in our rapid technological changing world.

2. ***Effect of Cooperative Learning Method on Students' Retention in Blocklaying Bricklaying and Concreting Work:*** Finding on shows that the experimental group of student taught with Cooperative learning method had a mean score of 84.11 in the pretest retention scale questionnaire and 106.85 in the post test retention scale questionnaire. The post test scores show that the experimental students obtained a higher mean score than the control group students. This finding indicate that effect of Cooperative learning methods on student retention work is mean effective is stimulating students retention in Bricklaying and Concreting Work work than the conventional lecture method Deirel, (2004) assents that retention is the ability to reproduce the learnt concept when the need arises, also student interest and retention and be aroused and retained through the use of appropriate teaching strategies which could be made more effective, lasting and enjoyable to student when made clearer, easier and meaningful for better achievement of the concept in learning Bricklaying and Concreting Work work.
3. ***Influence of Gender on Students' Academic Achievement in Blocklaying Bricklaying and Concreting Work:*** Finding on shows that male in the experimental group had a mean achievement scores of 10.42 and 11.24 in the pretest and posttest with corresponding standard deviation of 3.26 and 3.48 respectively. The female obtained mean achievement scores of 9.83 and 10.96 in the pretest and posttest with corresponding standard deviation of 3.89 and 4.06 respectively. This indicates that the female in the experimental group had a higher mean achievement score than the male taught with the same Cooperative learning method. There was a significant different between the influence of gender in student academic achievement in Bricklaying and Concreting Work was statistically significant favouring females. This finding is similar to findings of several other studies that had been conducted on gender. This also affirms Abonyi (2008) carried out a study to determine the influence of sex influence of students in the achievement in secondary school mathematics using 500 students (males and females). The result showed that performance does not depend on sex. Betiku (2002) observed sex difference in favour of males in school certificate set and probability theories. A sample of 376 students (208 males, 168 females) participated in the study. These students wrote a 20 item multiple choice questions in Senior Secondary Mathematics. Females performed better than males, while students in urban centers performed better than students in rural areas.

## Conclusion

The findings of this study concluded that students taught Blocklaying, Bricklaying and concreting using Cooperative learning achieved better than those taught using lecture method. This difference in achievement was significant. Female students taught Bricklaying and Concreting Work using Cooperative learning method had higher achievement score than the male students taught with the same method. Students taught using Cooperative learning method had better academic retention than those taught with lecture method. However, this difference was not significant.

## Recommendations

The following recommendations have been proffered based on the findings of the study.

1. Cooperative learning should be encouraged in Blocklaying, Bricklaying Concreting classrooms.
2. Universities and colleges of Education should organize workshops on importance of Cooperative learning method and how to effectively implement it.
3. In service training in the form of long vocation programmes, conferences and seminar on how to improve learning should be organized for teachers and educational administrators at all tires of government.

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