

EFFECT OF PROJECT TEACHING METHOD ON STUDENTS' ACADEMIC PERFORMANCE IN BRICKLAYING BLOCKLAYING AND CONCRETING TRADE IN TECHNICAL COLLEGES OF GOMBE STATE NIGERIA

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ABSTRACT

This study determined the effects of project teaching method on students' performance in bricklaying, blocklaying and concreting trade in technical colleges of Gombe State Nigeria. The population of the study was made up of 180 subjects while 41 NTC II BBC students made up the sample for the study. Multistage sampling technique was used in sampling the study. The subjects were separated into two groups; the experimental group (N = 19) and the control group (N=22). The study adopted pretest, posttest, quasi-experimental and control group design. The topics taught were foundation of building construction and bonding concepts and skills. Two instruments, specifically Bricklaying, Blocklaying and Concreting Achievement Test (BBCAT) and Bricklaying, Blocklaying and Concreting Practical Performance Test (BBCPPT) were used for data collection. Five research questions were raised and three hypotheses were formulated. The research questions were answered using mean and standard deviation while hypotheses were tested using Analysis of Covariance (ANCOVA) at 0.05 alpha level. The findings showed that (i) There is a significant difference in the performance of students taught bricklaying, blocklaying and concreting using project and demonstration teaching methods $F, (df=2, 41) = 3.500, p < 0.05$, thus the computed p-value 0.036 is less than 0.05 level of significant. (ii) There is no significant difference between male and female Bricklaying, blocklaying and concreting students' performance $F, (df=1, 41) = 0.1420, p > 0.05$, thus the computed p-value (0.707) is greater than > 0.05 level of significant. (iii) There is no interaction effect of teaching methods and gender on students' performance $F (df=2, 41) = 0.516, p > 0.05$, thus the computed p-value (0.599) is > 0.05 level of significant. Recommendations based on the findings showed that project teaching method improved students' performance. The use of activity based methods in teaching and learning of Bricklaying, Blocklaying and concreting should be given priority. On-the-job training for technical teachers in form of seminars, workshops and conferences should be organized on how to use project teaching method for teaching bricklaying, blocklaying and concreting.

INTRODUCTION

Project teaching method requires active engagement of students' effort over an extended period. Project teaching method (PTM) is an instructional methodology in which students develop important skills by participation in doing the actual job. Students apply core academic skills and creativity to solve problems in real world situations. Students use a wide range of tools and the culminating projects are tangible and observable artifacts that serve as evidence of what the students have learned. Student-produced videos, artwork, reports, photography, music, model construction, live

performances, action plans, digital stories and websites are all examples of project Based Learning artifacts. Project teaching method, based on the constructivist learning theory, states that learning is deeper and more meaningful when students are involved in constructing their own knowledge. Students are given the opportunity to select a topic that interests them within the required content framework and then they are responsible for creating their project plan, rather than a teacher. Typically, the teacher's role is that of an academic advisor, mentor, facilitator, task master and evaluator (Holubova, 2008).

Project teaching method has emerged to become an instructional approach that is gaining interest within the engineering education community (Haddam & Escher, 2002). Duch (2002) described project teaching method (PTM) as an instructional method that challenges students to 'learn how to learn, working cooperatively in groups to seek solutions to real world problem. According to Blair, Schwartz and Leelawong (2007) the traditional methods of lecture method does not foster critical thinking, creative thinking and collaborative problem solving. Binnie (2002) concluded, "The use of project teaching method is helpful in assisting the learning of the students". The students' active involvements in the task force them to think and therefore learning takes place. The use of real data of their own choice motivates them because they want to know what conclusion they might arrive at. Without the project, their understanding of the process of problem solving would have been very theoretical. Project work approach seems to have the components to motivate teachers and students to develop a cooperative work mainly aiming at the students to perceive and understand all the necessary stages required to arrive at logical conclusion (Biajone, 2006). Project teaching method goes beyond generating students' interest. Well-designed projects encourages active inquiry and higher-level thinking (Intel, 2003). Brain research underscores the value of these learning activities. Students' abilities to acquire new understanding are enhanced when they are "connected to meaningful problem-solving activities, and when students are helped to understand why, when, and how those facts and skills are relevant" (Bransford, Brown & Conking, 2000).

Project teaching method would be applied either individually or in combined with traditional teaching method. It will also be carried out individually or in small groups of students (Mills & Treagust, 2003). Project teaching method is suitable in teaching brick/block laying and concreting trade. For example, students may be assigned in group or individually to practice the different type of bonding such as header, stretcher, Flemish and English bonds independently. The project teaching method would be suitable in teaching both male and female students in technical colleges.

Gender as a moderator variable in this study refers to male and female in relation to learning of vocational and technical education in technical colleges. Gender has had significant effect on students' performance particularly in technical education. There is a societal feeling that technical skills are only suitable for the males and the females counterparts are discriminated against and discouraged from such type of career. There is also a negative societal perception that technical and vocational skills acquisition is incompatible with mother's role, at home and that girls who take to

such careers have small chances to get married. These negative thoughts may influence the interest and self-confidence of the female folk and reduce their ability and motivation to opt for careers in technical skills acquisition.

United Nation Education Scientific and Cultural Organization, UNESCO (2004) observed that one of the most urgent challenges facing the world today, is the growing number of people that are excluded from meaningful participation in the economy such a society is neither efficient nor safe. Egun and Tibi (2010) observed that perception, belief, system of life, goal and needs influence choice and entrance into occupation and profession thus giving meaning to human experience and the manner in which people think fully and act within their environment. One of such areas that have been so affected by these factors is the girl- child access to the study of science and technical subjects, thereby creating a gap in male - female ratio in vocational and technical education.

Eze, Ezenwafor and Obi (2015) observed that there is a general belief that boys are superior to girls in terms of cognition and logical reasoning and even in academic performance. Eze et.al (2015) asserted that factors that affect students' academic performance in science and technology subjects include sex role stereotype, masculine image and female socialization process and inability to withstand stress.

The goals of technical and vocational education are to provide trained work force in the applied sciences, technology and business particularly at the craft, advanced craft and technical level. It is also to provide technical knowledge and vocational skills necessary for agriculture, commercial and economic development and to impart the necessary skills into individuals in order to make them self-reliant economically. In pursuance of these goals; Science and Technology Education act (2000) declared that, it is the policy of the Federal Government of Nigeria to encourage men and women equally, of all ethnic, racial, and economic background to acquire skills in science, technology and mathematics.

World Health Organization (WHO, 2009) defined gender as the result of socially constructed ideas about the behavior, actions and roles a particular sex performs. According to Wall (1997), it is the natural difference between men and women, which dictate on their occupational choice, while Nikolaenko, (2005) stated that the boys are better at mental manipulation of images, which may benefit problem – solving, design and construction skills. Natalie (2006) noted that the gender psychological difference at birth for males and females are the same and that it is the way they are treated that gives them what we consider as typical male and female characteristics. Nabulya (2004) also found out that more males than females choose vocational and technical subjects.

Technical Vocational Education and Training (TVET) is that aspect of education that exposes the learner to acquisition of demonstrable skills that could be transformed into economic benefits (Akerele, 2007). However, United Nation Educational Scientific and Cultural Organization

(UNESCO 2002) Sees TVET as a comprehensive term which encompasses the study of technologies and related sciences, and the acquisition of practical skills, attitudes, understanding and knowledge related to occupations in various sectors of economic and social life. Technical and Vocational Education and Training (TVET) is defined by kutz (2001) as an education which prepares individuals for the world of work. It is also a viable tool for sustainable development. According to Man (2005), Technical Vocational Education and Training (TVET) is the systematic and orderly transmission of knowledge, skills and values to develop a workforce that is able to enhance productivity and sustain competitiveness in the global economy. It encompasses the ability to accelerate economic growth, provide marketable labour supply, minimize unemployment and underemployment, infuse technical knowledge and reduce poverty.

Bricklaying, blocklaying and concreting is among the trade components of vocational and technical education offered in technical college aimed at giving students adequate knowledge and skills for securing employment in building construction related fields in any society. The aims of bricklaying, blocklaying and concreting according to National Business and Technical Examination Board (NABTEB) in John (2004) Bricklaying, Blocklaying and Concreting trade is designed to Introduce the trainee to:

- i. To the basic construction principles, materials and methods so that they may be able to appreciate the roles of the various trades in the building industry.
- ii. With the essential knowledge and skill that will enable him perform completely all aspects of brickwork in the construction industry.
- iii. With the essential knowledge and skill that will enable him perform proficiently all aspects of block layers working the construction industry.
- iv. With the basic knowledge of the properties and applications of concrete as well as the skills in the production of sound concrete structures.
- v. With the basic knowledge of finishing materials related to the buildings work and to enable him apply such finishes proficiently.
- vi. With the basic knowledge and skills of plumbing for water services in building.

STATEMENT OF THE PROBLEM

Technical colleges are mainly established for the training of students to acquire practical skills, knowledge and attitudes essential for employment in a given occupation. Unfortunately, these skilled job opportunities in industries are not filled, because technical college graduates are not technically competent enough to take up the available skilled jobs (Okorie in John, 2004). Technical college graduates are weak in the practice of their trades (Oranu, 2001). Furthermore, the standard of performance of Nigerian technicians in general, is at the moment very low, thereby retarding the overall productivity of the Nigerian economy (Okorie, 2001)

National Business for Technical Examination Board NABTEB (2002) observed that Poor or inappropriate teaching methods employed by teachers to teach technical colleges students is one of the probable cause of high failure of students. Adebayo (2010) state that poor performance of many technical colleges' students may be attributed to neglect, poor funding, and inadequate resources and inappropriate teaching methods. Similarly, Oranu in Shirly and Benjamin (2015) Posited that teachers used lecture and demonstration methods in technical. Therefore, Poor performance of the technical college products is a problem to the national economy and technological development in Nigeria. It is against this background that the study seeks to investigate the effects of project teaching method which is activity based on students' academic performance in bricklaying, blocklaying and concreting trade in technical colleges in Gombe state

PURPOSE OF THE STUDY

The main purpose of the study was to determine the effect of project leaching methods on students' performance in bricklaying, blocklaying and concreting trade in technical colleges in Gombe State. Specifically the study is to:

- i. Determine the mean scores of students taught bricklaying, blocklaying and concreting trade using project teaching method in technical colleges.
- ii. Determine the mean scores of students taught bricklaying, blocklaying and concreting trade using demonstration teaching method in technical colleges.
- iii. Determine the mean scores of male and female students taught bricklaying, blocklaying and concreting trade using project teaching method in technical colleges.
- iv. Determine the mean scores of male and female students taught bricklaying, blocklaying and concreting trade using demonstration teaching method in technical colleges.
- v. Compare the mean difference between the project teaching method(experimental group) and demonstration teaching method(control group) on students' performance in bricklaying, blocklaying and concreting in technical colleges.
- vi. Determine the interaction effect of teaching methods and gender on students' performance in bricklaying, blocklaying and concreting trade in technical colleges.

1.4 Research Questions

The following six research questions were raised to guide the study:

- i. What are the mean scores of BBC students taught using project teaching method in bricklaying, blocklaying and concreting trade in technical colleges.
- ii. What are the mean scores of BBC students taught using demonstration teaching method in bricklaying, blocklaying and concreting trade in technical colleges.
- iii. What are the mean scores of male and male BBC students taught using project teaching method in bricklaying, blocklaying and concreting trade in technical colleges?
- iv. What are the mean scores of male and female BBC students taught using demonstration teaching method in technical colleges?

- v. What are the mean difference between male and female students' performance taught bricklaying, blocklaying and concreting using projects teaching methods?
- vi. What are the mean difference between the project teaching method (experimental group) and demonstration teaching method(control group) on students' performance in bricklaying, blocklaying and concreting

Hypotheses

The following three hypotheses were formulated and tested at 0.05 level of significance.

H₀₁: There is no significant difference between the performances of students' taught bricklaying, blocklaying and concreting using protect and demonstration teaching methods.

H₀₂: There is no significant difference between the performance of males and females students taught bricklaying, blocklaying and concreting using project and demonstration teaching methods.

H₀₃: There is no interaction effect of teaching methods and gender on bricklaying, blocklaying and concreting students' performance.

METHODOLOGY

The design for the study is a quasi-experimental design, which involves a pre-test, post-test and non-equivalent control group design. This design is adopted because of it suitability to investigate the possible cause and effect as well as relationship between two or more variables by the application of treatment which cannot be resolved by observation or description". The experimental and control groups were pre-tested to determine the group equivalence at the start of the experiment. The design is presented diagrammatically below (Cohen, Manion and Morrison, 2007).

Experimental O_1 X O_2 (Project teaching method)

Control O_3 O_4 (Demonstration method)

O_1, O_3 represent the pretest scores of all the groups

O_2 and O_4 represent the post-test scores of all the group

X represents the treatment that was given to experimental group (Project teaching method).

The area of the study is Gombe state, which is located in the Northeastern part of Nigeria sharing boundary with Adamawa by the southeast, Taraba by the south, Bauchi by the west, and Borno state by the east. Gombe state is located between latitude 10o 15 N and longitude 11o 10 E. There are seven Technical colleges located in five local government areas within the study area.

The target population of the study was 180 NTC II Bricklaying, Blocklaying and Concreting students of Government Science and Technical colleges of Gombe State. The sample for the study consisted of 41 NTC II students offering bricklaying, blocklaying and concreting in the three Technical colleges of Gombe state. Multistage sampling technique was used in selecting the samples. The first stage was stratified random sampling in which Gombe state was stratified into three educational zones. Secondly, purposive sampling was used in selecting co-educational technical college in each

of the educational zone in the state, because the study is gender sensitive. One technical college was selected in Gombe central education zone using purposive sampling, because there are three technical colleges in the zone where two are not co-educational technical colleges. Thirdly, one technical college found in Gombe south education zone was selected using purposive sampling because it is co-educational technical college. Fourthly, simple random sampling was used in choosing one technical college from three co-educational technical colleges in Gombe North education zone through balloting system. Finally, simple random sampling was also used in assigning experimental and control groups through balloting.

The instrument used for data collection was tagged; Bricklaying, blocklaying and Concreting Achievement/Performance Test (BBCA/PT). The instrument was adapted from NABTEB past questions in bricklaying, blocklaying and concreting from 2011 – 2016. The Bricklaying, blocklaying and Concreting Performance Test (BBCA/PT) consisted of three parts; part 1 sought for students' personal data such as; school, gender and class while part two consists of questions on the concepts of bricklaying, blocklaying and concreting and part three consists of one practical performance test question based on NTC II syllabus. The achievement test consisted of 20 multiple-choice items with four (4) options lettered A-D, which was scored two, marks each alongside with one practical question scored 60 marks giving a total of 100 marks. The instrument was validated by three experts from Technology Education Department, Modibbo Adama University of Technology, Yola. The validates made some corrections, suggestions and determined the face and content validity of the instrument.

The bricklaying, blocklaying and concreting performance test instrument was administered to the NTC II BBC students of Government Science and Technical College, Yola for trial testing to determine the reliability of the instrument, because the students are out of the researcher's study area but with educational background similar to those in the researcher study area. The data obtained was computed using Cronbach Alpha formula and the reliability co-efficient of 0.87 was obtained.

One research assistant for a particular group was appointed and given induction training by the researcher for each of the technical colleges sampled, who have the same qualification and teaching experiences. The experimental group, which consists of bricklaying, blocklaying and Concreting (BBC) students, was taught for a period of six weeks, using project teaching methods. Materials such as bricks, limestone, line and pin, trowels, spirit level, head pans, were made available to students for carrying out the practical activities. During the lesson, the students were given projects to carry out activities such as bonding of bricks, casting of different types of foundations/models for the project teaching method. The control group which consists of the BBC students as in the experimental group was also taught for a period of six weeks using the demonstration method of teaching, this method involves showing and telling students the process skills in bonding bricks and foundations casting.

The data collected were analyzed using Statistical Package for Social Science (SPSS) version 16.0. Mean and standard deviation were used to answer the research questions while ANCOVA was used to test the hypotheses at 0.05 level of significance. The results obtained was used in determining whether or not there is a significant difference among project and demonstration teaching methods on students' performance in bricklaying, blocklaying and concreting in technical colleges of Gombe State.

Decision taking on testing the null hypotheses was based on comparing the computed p-value and level of significance. If the computed p-value is greater than 0.05 level of significance the null hypothesis will be accepted and concluded there is no significant difference between the variables compared. However, if the computed p-value is less than or equal to 0.05 level of significance the null hypothesis will be rejected, and concluded that, there is significant difference between the variables compared. Post hoc analysis will also be used if the computed ANCOVA value is found to be significant in order to determine the group that brings about the significant effect.

RESULTS AND DISCUSSION

The results of data analysis are presented here in a Tabula format under each research question. Each presentation is followed by the analysis of the said result.

Research Question 1

What are the mean scores of BBC students taught using project teaching method in bricklaying, blocklaying and concreting trade in technical colleges?

Table 1: Mean Scores of BBC students taught using Project Teaching Method

Teaching Methods		Pre test		Post Test		Mean difference
	N	(\bar{X})	S.D	(\bar{X})	S.D	
project teaching method	19	29.42	3.95	58.47	12.56	29.05

The result presented in Table 1 indicates that for the group (19 students) taught using project Teaching Method scored a pre-test mean of 29.42 % there is to a great extent improvement in their performance after the treatment with a mean post-test score of 58.47 %. While the pretest and post-test mean difference is 29.05%. The post-test mean scores clearly show that the Project Teaching Method had also positively improved the students' academic performance. It is therefore safe to conclude based on this analysis that Project Teaching Method had also highly improved the performance of BBC Trade students in Gombe state technical college.

Research Question 2

What are the mean scores of BBC students taught using demonstration teaching method in bricklaying, blocklaying and concreting trade in technical colleges?

Table 2: Mean Scores of Pre-tests and Post-Tests of BBC Students Taught using Demonstration Teaching Method

Teaching Methods	N	Pre test		Post Test		Mean dif
		(\bar{X})	S.D	(\bar{X})	S.D	
Demonstration Teaching Method	22	30.27	4.99	48.73	10.30	18.45

Table 2 indicated a result for the group (22 students) taught bricklaying, blocklaying and concreting using Demonstration Teaching Method scored a pre-test mean of 30.27% there is an improvement after the treatment with a post-test mean score of 48.73% while the pre-test and post-test mean difference for the group is 18.45%. This result shows that Demonstration Teaching Method had the least percentage in improvement of BBC students' academic performance in this study.

Research question 3

What are the mean scores of male and male BBC students taught using project teaching method in bricklaying, blocklaying and concreting trade in technical colleges?

Table 3: Mean Difference of Male and Female Students Taught Bricklaying, Blocklaying and Concreting using Project Teaching Method

Teaching Methods	Gender	N	Pretest		Posttest		Mean Gain
			(\bar{X})	S.D	(\bar{X})	S.D	
project teaching method	Male	16	29.625	4.193	59.563	13.406	31.000
	Female	3	28.333	2.517	52.667	3.512	24.334
	Mean difference		1.292	1.676	6.896	9.894	6.666

The result in Table 3 shows that male students taught bricklaying, blocklaying and concreting using project teaching method had pre-test mean scores of 29.63%. There is to a large extent positive improvement after the treatment with post-test mean scores 59.56%. The pre-test and post-test mean gain of 31.00% obtained. Therefore based on this result it clearly shows a positive improvement in BBC students' academic performance. The corresponding female students taught bricklaying, blocklaying and concreting using the project teaching method had the pre-test mean scores 28.33%. There is a positive improvement after the treatment with a post-test mean scores 52.67%. The mean gain of 24.33% is observed which shows the extent of the improvement between the pre-test and

post-test in BBC students' academic performance. The post-tests mean difference of 6.89% is observed between the male and female BBC students taught using project teaching method in Gombe state.

Research question 4

What are the mean scores of male and female BBC students taught using demonstration teaching method in technical colleges?

Table 4: Mean Difference between Male and Female Students Taught Bricklaying, Blocklaying and Concreting using Demonstration Teaching Method

Teaching Methods	Gender		Pretest		Posttest		Mean Gain
		N	(\bar{X})	S.D	(\bar{X})	S.D	
Demonstration Teaching Method	Male	18	30.273	4.997	49.111	10.011	18.838
	Female	4	28.000	7.439	47.000	13.038	19.000
Mean Difference			2.273	-2.442	2.111	-3.027	-0.162

The result in Table presents that for group of male students) taught bricklaying, blocklaying and concreting using demonstration teaching method had a pre-test mean scores of 30.27%. There is to a large extent positive improvement after the treatment with a post-test mean scores 49.11%. The pre-test and post-test mean gain of 18.84% is obtained. Therefore based on this result it clearly shows a positive improvement in BBC students' academic performance. The corresponding female students taught bricklaying, blocklaying and concreting using the demonstration teaching method had the pre-test mean scores 28.00% there is also a positive improvement after the treatment with a post-test mean scores 47.00%. The mean gain of 19.00% is observed which shows the extent of the improvement between the pre-test and post-test in BBC students' academic performance. The post-tests mean difference of 6.89% is observed between the male and female BBC students taught using demonstration teaching method in Gombe state.

Research Question 5

What are the mean difference between Project Teaching Method (experimental groups) and Demonstration Teaching Method (control group)?

Table: 8 Mean Difference Between Experimental and Control Groups

Teaching Methods	Experimental and Control Group	
Project Teaching Method-	29.42	58.47
Demonstration Teaching Method	30.27	48.73
Mean Difference	= 0.85	= 9.74

The result in Table 5 presented the mean difference between the experimental and control groups of BBC students taught using project teaching method (experimental groups) and demonstration teaching method (control group) The pre-test mean difference between project teaching method group (experimental group II) and demonstration teaching method group (control group) equal to - 0.85%. Based on this it is concluded that the two groups are equivalent for comparison. The mean difference between project teaching method group and demonstration teaching method equal to 9.74 which shows that project teaching method supersedes demonstration teaching in term of improving students' academic performance in BBC trade in technical colleges in Gombe state.

Hypothesis 1

Ho1:There is no significant difference in the performance of students' taught bricklaying, blocklaying and concreting using project and demonstration teaching methods.

Table 6: A summary of one - way Analysis of Covariance (ANCOVA)

Source	Type III Sum of Squares	Df	F	Sig.	Partial Eta Squared
Corrected Model	1994.787 ^a	6	2.404	0.037	.189
Intercept	8028.646	1	58.044	0.000	.484
Pretest	33.916	1	0.245	0.622	.004
Teaching methods	968.371	2	3.500	0.026	.101
Error	8575.850	32			
Total	227515.000	41			
Corrected Total	10570.638	40			

The result in Table shows that $F, (df = 2, 41) = 3.500$, where $p < 0.05$, thus indicating the computed p-value 0.026 is greater than 0.05 level of significant with a medium effect size (partial eta squared = 0.101). Therefore, the null hypothesis is rejected meaning that there is significant difference between the performance of students taught using project and demonstration teaching methods. Hence,

Bonferroni multiple comparison analysis was run which showed that the significant difference is in favour of project teaching method over the demonstration teaching method.

.Hypothesis 2

H₀₂: There is no significant difference between the performance of males and females students taught bricklaying, blocklaying and concreting using inquiry, project and demonstration teaching methods.

Table 8: ANCOVA Test of Significant Difference in the Performance of Male and Female Students Taught Bricklaying, Blocklaying and Concreting using Project and Demonstration Teaching Methods

Source	Type III Sum of Squares	Df	F	Sig.	Partial Eta Squared
Corrected Model	1994.787 ^a	6	2.404	0.037	.189
Intercept	8028.646	1	58.044	0.000	.484
Pretest	33.916	1	0.245	0.622	.004
Gender	19.678	1	0.1420	0.707	0.002
Error	8575.850	32			
Total	227515.000	41			
Corrected Total	10570.638	40			

The result in Table 8 shows that, $F(df = 1, 41) = 0.1420$, $p > 0.05$. Thus, the computed p-value (0.707) is greater than 0.05 level of significant, therefore, the null hypothesis of no significant difference is not rejected, which means there is no significant difference between male and female bricklaying, blocklaying and concreting on the students' performance in BBC trade.

Hypothesis 3

H₀₃: There is no interaction effect of teaching methods and gender on bricklaying, blocklaying and concreting students' performance.

Table 9: Two - way Analysis of Covariance (ANCOVA) Test of Interaction Effect of Teaching Methods and Gender

Source	Type III Sum of Squares	Df	F	Sig.	Partial Eta Squared
Corrected Model	1994.787 ^a	6	2.404	0.037	.189
Intercept	8028.646	1	58.044	0.000	.484
Pretest	33.916	1	0.245	0.622	.004
Teaching methods	968.371	2	3.500	0.036	.101
Gender	19.678	1	0.1420	0.707	0.002
Teaching methods and gender	142.869	2	0.516	0.599	.016
Error	8575.850	32			
Total	227515.000	41			
Corrected Total	10570.638	40			

Result in Table 9 reveals that $F, (df = 2, 41) = 0.516, p > 0.05$, Thus, the computed p – value (0.599) is greater than 0.05 level of significant. Therefore, the null hypothesis is not rejected meaning that there is no significant interaction effect of teaching methods and gender on students' performance in the BBC trade.

Finding of the study

Based on the analysis of the data the following findings were made:

1. The bricklaying, blocklaying and concreting students taught using the project teaching method had a pretest and post-test mean difference of 29.05%,
2. The bricklaying, blocklaying and concreting students taught using demonstration method of teaching had the pretest and post-test mean difference of 18.72%,
3. The male BBC students taught bricklaying, blocklaying and concreting using project teaching method had a pre-test and post-test mean difference of 29.94% while the female counterpart students taught bricklaying, blocklaying and concreting using project teaching method had also achieved a pre-test mean difference of 24.33%. Therefore, the male BBC students had the highest mean scores than the female counterpart in project teaching method.
4. The male bricklaying, blocklaying and concreting students taught using demonstration teaching method obtained a pretest and posttest mean difference of 18.84%. The female bricklaying, blocking and concreting students taught using demonstration teaching method improved to about 19.00% than its pretest mean gain. Therefore, the female BBC students had the highest mean difference compared to the male counterpart in demonstration teaching method.
5. When project teaching method was compared with demonstration teaching method a mean difference of 8.00 was obtained.
6. There is a significant difference in the performance of students taught BBC using project and demonstration teaching methods which is in favour of project teaching method, thus $F, (df = 2,$

41) = 3.500, $p < 0.05$, since the computed p-value 0.026 is less than 0.05 level of significance. The null hypothesis is rejected.

7. There is no significant difference between male and female bricklaying, blocklaying and concreting students' performance that were taught using project and demonstration teaching methods, $F, (df=1, 41) = 0.1420, p > 0.05$. Thus, the computed p-value (0.707) is greater than 0.05 level of significant, and then the null hypothesis of no significance difference is not rejected.
8. There is no significant interaction effect of teaching methods and gender on students' academic performance, $F, (df= 2, 41) = 0.516, p > 0.05$. Thus, the computed p – value (0.599) is greater than 0.05 level of significance. Therefore, the null hypothesis is not rejected.

DISCUSSION

This study determined the effect of project teaching method on students' performance in bricklaying, blocklaying and concreting trade. It determined the effects of project teaching method on male and female students' performance in bricklaying, blocklaying and concreting trade. It also determines the interaction effect of teaching methods and gender. Over the years, the performance of bricklaying, blocklaying and concreting students' is below expectation particularly in the practical skills performance, which might be attributed to teacher, centered teaching methods instead of students centered method of teaching. Adebayo (2010) states that, poor performance of many technical college students may be attributed to neglect, poor funding, and inadequate resources and inappropriate teaching methods. In this study, therefore, the researcher used students - centered teaching methods such as inquiry and project method of teaching and determined their effects on students' performance.

The finding showed that project teaching method was more effective than demonstration teaching method in improving students' performance in bricklaying, blocklaying and concreting trade (BBC). The superiority of the teaching method over demonstration teaching method could be attributed to the intervention given during this research. Therefore, the use of project teaching methods immensely helped the students in acquiring knowledge and skills on bonding and foundations during the treatment. These findings agree with the finding of Agboola and Oloyede (2007) who found that the students taught project method brings about a significant difference in the achievement of the experiments of subjects in the experimental group compared with those exposed to demonstration methods of teaching. In addition, the findings agree with that of Omoka and Adejo (2015) which shows that the students taught using project teaching method performed significantly better than those who taught using demonstration method. Based on the results obtained, it could be concluded that project teaching method enable students see in their mind's eye abstract concepts, establish their thinking about the given topics and learn the topics, concept and skills meaningfully.

The finding in this reveals that gender has no effect on the students' performance in bricklaying, blocklaying and concreting. This finding agrees with Natalie (2006) who noted that the gender psychological difference at birth for males and females are the same and that it is the way they are

treated that gives them what we consider as typical male and female characteristics. The result however contrasted with the finding of Ibrahim, Adisa, Abdulkadir, and Nene(2013) who found that the male students performed better in bonding task (Flemish bond,) arch construction and construction of fire place and chimney stack task than the female students stereotyping roles.

The finding also shows that there is no interaction effect of teaching methods and gender on students' performance in brick/blocklaying concreting. The finding agrees with the finding of Olatoye, Aderogba and Aenu (2012) who found that the interaction effect of treatment, gender and self-concept on students' achievement in organic chemistry is not significant.

CONCLUSION

Based on the findings of this study, it is therefore, concluded that the use project teaching method will highly improve students' performance in BBC trade. Nevertheless, demonstration teaching method also enhanced students' performance in bricklaying, blocklaying and concreting trade. The gender barriers of the students do not influence their performance in bricklaying, blocklaying and concreting. Students taught concepts and skills of foundation and bonding using project teaching method attained higher than those taught same concepts and skills did using demonstration teaching method. Therefore, technical teachers, bricklaying, blocklaying, and concreting teachers in particular if use project teaching methods, the students' performance would be at the greatest high.

RECOMMENDATIONS

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

1. The practice project teaching method which is amongst the activity-based teaching methods, and students-centered method of teaching and learning bricklaying, blocklaying and concreting should be given consideration. Based on the results of this study it has clearly shown that project teaching method improved students 'performance drastically.
2. On-the-job training for technical teachers in form of workshops, seminars and conferences should be organized on how to use project teaching method for better teaching of bricklaying, blocklaying and concreting skills and concepts.
3. There should be proper provisions of facilities, tools and equipment, which are necessary for teaching concept and skills in bricklaying, blocklaying and concreting trade effectively.

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