Research Paper   **Education**

Effect of Project Instructional Approach on The Academic Achievement of Building Construction Students in Technical Colleges in ogun State, Nigeria

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ABSTRACT   *The study was carried out to determine the effect of project instructional approach on the academic achievement of Building Construction students in Government Technical Colleges in Ogun State, Nigeria. A quasi experimental research design was adopted for the study. The population comprised 115 second year Building Construction students in the two technical colleges that run Building construction programme in the State. The instrument used for data collection was Building Construction Achievement Test. Mean and standard deviation were used to analyze the data for answering the four research questions while Analysis of Covariance (ANCOVA) was used to test the four null hypotheses at 0.05 level of significance. The study found that students taught with project instructional approach had higher mean achievement post-test scores than students taught with the conventional method. Based on the findings, it was recommended that Building Construction teachers should always use project instructional approach to enhance students skill acquisition.*

KEYWORDS : Technical Colleges, Building Construction, Academic Achievement, Project Instructional Approach

1. Introduction

There are public complaints about the poor performance of technical college students in various examinations conducted by National Business and Technical Examinations Board (NABTEB). Eyibe (2002) observed that the quality of graduates of technical colleges in terms of competence leaves much to be desired. Employers as well as parents are concerned about the quality of technical education programmes in Nigeria technical colleges. The development of a nation depends mostly on the type of technology inherited or invented and the ability to train the citizens to sustain the technical development. Nigeria hopes to achieve technological development through vocational education offered in technical colleges (FRN, 2004).

1.1a Definition of Variables - Technical Colleges

Technical colleges, in Nigeria, are regarded as principal vocational institutions which are required to prepare individuals to acquire practical skills, knowledge and attitude required of technicians at sub-professional level (Okoro, 2000). Technical colleges give full crafts training intended to prepare students for entering into various occupations. Technical colleges are for the development of job-related skills, not only as a part of the country's human resources strategies but also of the economic growth and poverty reduction strategies (Osuala, 2004). Furthermore, technical colleges according to FRN (2004) are designed to combine the exploration and development of ideas with expression in visual and material form. In addition to exploration and development of ideas with relevant knowledge and skills, technical colleges offer a wide range of context within which students:

- learn how to control or modify the environment to meet defined needs
- develop skills and judgment in the selection and use of resource including raw materials, technological equipment and information technology.
- gain the ability to interpret commercial and technical ideas using a variety of media
- acquire a systematic approach to solving problems and making decisions
- develop critical thinking and the ability to evaluate the quality and effectiveness of products and systems
- develop skills in teamwork

However, there are many criticisms nowadays that the products of technical colleges are unable to put into practice what they learnt in school. This is evidence in the poor performances of students in trade subjects such as Building Construction.

1.1b Building Construction

Building construction is one of the technical courses offered by the students of technical colleges in order to acquire practical skills. It is one of the courses in technical colleges where students work with materials, tools, equipment and machines to carry out various building activities. Building Construction is a three-year programme in technical colleges. The major components are setting out, block/bricklaying and concreting, walling, flooring, ceiling, rendering and finishing. Building Construction programme at the technical colleges is designed to produce competent building craftsmen with sound knowledge, skill and attitude required for the erection, repairs and maintenance of building structure (NBTE, 2001). According to National Policy on Education (2004), on completion of the programme, the graduates have the following options:

1. Secure employment in industries
2. Set up their own business, become self-employed and be able to employ others.
3. Pursue further education in technical institutions such as Polytechnics, Colleges of Education (Technical) and Universities.

However, the graduates academic achievement must be high inorder to fit into any of these options.

1.1c Academic Achievement

Achievement is a measure of what a person has learned within or up to a given time. It is a measure of accomplished skills and indicates what a person can do at the present. Simpson and Weiner, (2001) defined achievement as attained success in any act. Academic achievement according to Wikipedia (2010) is something an individual does or achieves at school, college or University, in class, in a laboratory, library or field work. In education, achievement specifically refers to students' success in learning a specified curriculum content. A test set specially to cover the taught curriculum content is usually called achievement test. Anaele and Bargu (1997) stated that achievement test is one based on a course content the students have learnt. Rohwer, Rohwer and B-Howe (1990), Umunadi, (2009) stated that students achievement has to do with ability to perform with accuracy and excellence as measured against specific standards of attainment. This implies that achievement measurement against these standards means a systematic and purposeful qualification of learning outcomes. The instructional approach adopted is the key to students' academic achievement.

1.1d Project Instructional Approach

Projects are those learning activities that permit students to choose, plan and direct their work under conditions approximating to those real-life situations. Projects are assigned to students either in groups or individually and they are required to apply the knowledge and skills learned in the course to execute or carryout the project. Project instructional approach allows the students to use their initiatives backed up with instructions and guidelines from the teacher to execute the project. It is a student-centred method of teaching in technical education in which the learner is allowed a great deal of involvement right from the planning stage, the sketch of the project, steps in executing it, the tools, equipment and materials to be used up to the assembling stage of the project. (Knoll, 1997). Project instructional approach enables students to make practical use of the equipment available in the workshop, thereby consolidating the students knowledge of theoretical information and help them develop practical skills. Project instructional approach enables each student to work at own rate and receives any necessary assistance from the teacher (Sola and Ojo, 2007). This implies that project instructional approach offers students the ideal opportunity for pursuing questions of continuity and the spread of educational innovations.

2. Statement of the Problem

The poor performance of Building Construction graduates from technical colleges in the field is affecting the building industry in Nigeria. Students poor performance in technical examinations including Building Construction in the National Business and Technical Examinations Board (NABTEB) can be attributed to instructional delivery (Ede, 1999, Anaele, & Bargu, 2010). Traditional teaching methods such as demonstration, lecture and discussion mostly adopted by instructors in teaching Building Construction in technical colleges do not seem to address students' predispositions (Anaele, 2000).

The academic achievement of Building Construction students in technical colleges with the use of these methods is very poor. Bruldi (2000) noted that these methods often create frustration and learning difficulties for students in mixed ability grouping. The need therefore arises to try out a student centered and involving methodology such as project instructional approach in the teaching of Building Construction to determine the effect on the academic achievement of Building Construction students in technical colleges in Ogun State, Nigeria.

Research Questions

The following research questions guided the study:

1. What is the effect of project instructional approach on the mean achievement scores of students in setting out and foundation?
2. What is the effect of project instructional approach on the mean achievement scores of students in concreting?
3. What is the effect of project instructional approach on the mean achievement scores of students in walling?
4. What is the effect of project instructional approach on the mean achievement scores of students in flooring/finishing?

Hypotheses

The following null hypotheses were formulated to guide the study:

Ho_1 There is no significant difference in the mean achievement scores of students taught with project instructional approach and those taught with the conventional method in setting out and foundation.

Ho_2 There is no significant difference in the mean achievement scores of students taught with project instructional approach and those taught with the conventional method in concreting.

Ho_3 There is no significant difference in the mean achievement scores of students taught with project instructional approach and those taught with the conventional method in walling.

Ho_4 There is no significant difference in the mean achievement scores of students taught with project instructional approach and those taught with the conventional method in flooring/finishing.

3. Methodology

The quasi-experimental design was used to conduct the study. The non- equivalent control group design was adopted. Randomization of subjects was not used so as not to disrupt the academic class settings

in the selected technical colleges. The intact classes were used as experimental and control groups. Project instructional approach was used to teach the experimental group while conventional method was used to teach the control group. Both groups took a pre-test and post-test. The design of this study is illustrated as follows:

Experimental Group   01 x 02

Control Group   01 - - 02

Where   01 is the pre – test

                      02 is the post – test

                      X is the treatment

                      - - stands for no treatment.

The study was carried out in two Government Technical Colleges that offer Building Construction in Ogun State, South-west Nigeria. The population comprised 57 year two students for the experimental group and 58 year two students for the control group. The two intact classes of Building Construction second year students were used for the study.

3.1 Instrument for Data Collection

The instrument for data collection was Building Construction Achievement Test (BCAT). BCAT is a 40 – item multiple choice achievement test in Building Construction that was administered as pre-test and post – test to the groups. It covered such topics as setting out foundations, concreting, wall and floors/finishes.

The project instructional lesson plans, the conventional method lesson plans and BCAT were validated by Building Construction experts in Industrial Technical Education, Measurement and Evaluation experts from University of Nigeria, Nsukka and Tai Solorin University, Ogun State. The reliability of BCAT was established using test re-test method and the Pearson Product Moment Correlation was used. A reliability coefficient of 0.85 was obtained.

The data for the study was collected by administering the Building Construction Achievement Test on both the experimental and control groups as pre-test and again as post – test after the treatment. The regular class teachers in the participating technical colleges taught their own students. The researchers were not involved directly in the teaching and test administration to avoid any experimental bias.

The experiment lasted for a school term of 12weeks. The experimental group was taught with the project instructional approach lesson plans while the control group was taught with the conventional lesson plans.

Data obtained were analysed using mean and standard derivation to answer the research questions and Analysis of Covariance (ANCOVA) to test the hypotheses at 0.05 level of significance.

4. Results

The results of the study were presented in line with the research questions and corresponding hypotheses.

Table 1: Mean and Standard Deviation of Experimental and Control Groups in Building Construction Achievement Test in Setting out and Foundation

		Pre – test		Post – test		Post-test gain
Group	N	X	SD	X	SD	
Experimental	57	23.53	2.58	29.45	1.38	5.92
Control	58	8.43	6.34	9.98	7.67	1.55

Data in Table 1 show that the experimental group had a mean score of 23.53 and standard deviation of 2.58 in the pre-test and a mean score of 29.45, standard deviation of 1.38 in the post –test making a

pre-test post-test gain of 5.92. The control group had a mean score of 8.43 and standard deviation of 6.34 in the pre-test and mean of 9.98 with standard deviation of 7.67 in the post-test making a pre-test post-test gain of 1.55. This shows that the experimental group performed better than the control group.

Table 2: Analyses of Covariance of the Scores of Experimental and Control Groups in Building Construction Achievement Test in Setting out and Foundation

Sources of Variation	df	Sum of square	Mean square	F-cal	F – crit
Between Groups	1	243.691	243.691	59.048	3.92
Within Groups	113	466.296	4.127		
Total	114	709.987			

Data presented in Table 2 show that F-cal (59.0458) is greater than F-critical (3.92) at 0.05 level of significance, the null hypothesis is rejected. This means that there is significant difference in the mean achievement scores of students taught with project instructional approach and those taught with the conventional method.

Table 3: Mean and Standard Deviation of Experimental and Control Groups in Building Construction Achievement Test in Concreting

		Pre – test		Post – test		Post-test gain
Group	N	X	SD	X	SD	
Experimental	57	20.06	2.08	30.45	2.67	10.49
Control	58	6.55	7.44	10.98	7.99	4.33

Data presented in Table 3 show that the experimental group had mean achievement score of 20.06 and standard deviation of 2.08 in the pre – test, mean achievement score of 30.45 and standard deviation of 2.67 in the post – test making a pre – test post – test gain of 10.39.

The control group had a mean achievement score of 6.55 and standard deviation of 7.44 in the pre-test and mean achievement score of 10.98, standard deviation of 7.99 in the post-test indicating a post-test gain of 4.33. This shows that the experimental group performed better than the control group.

Table 4: Analysis of Covariance of the Scores of Experimental and Control Groups in Building Construction Achievement Test in Concreting

Sources of Variation	df	Sum of square	Mean square	F-cal	F – crit
Between Groups	1	362.214	362.214	74.392	3.92
Within Groups	113	550.261	4.869		
Total	114	912.475			

Data presented in Table 4 show that F-cal (74.392) is greater than F-critical (3.92) at 0.05 level of significance, the null hypothesis is rejected. This implies that significant difference exists in the mean achievement scores of students taught with project instructional approach and those taught with the conventional method.

Table 5: Mean and Standard Deviation of Experimental and Control Groups in Building Construction Achievement Test in Walling

		Pre-test		Post – test		Post-test gain
Group	N	X	SD	X	SD	
Experimental	57	19.36	2.89	28.36	2.17	9.00
Control	58	7.05	6.34	9.18	8.29	2.13

Data presented in Table 5 indicated that the experimental group had a mean achievement score of 19.36 and standard deviation of 2.89 in the pre – test, mean achievement score of 28.36 and standard deviation of 2.17 in the in the post – test making a pre – test post – test gain of 9.00. The control group had mean achievement score of 7.05, standard deviation of 6.34 in the pre – test, mean achievement score of 9.18, standard deviation of 8.29 in the post – test thereby making pre – test post – test gain of 2.13. This implies that the experimental group performed better than the control group.

Table 6: Analysis of Covariance of the Scores of Experimental and Control Groups in Building Construction Achievement Test in Walling

Sources of Variation	df	Sum of square	Mean square	F-cal	.crit
Between Groups	1	1102.115	1102.115	38.421	3.92
Within Groups	113	3241.443	28.685		
Total	114	4343.558			

The null hypotheses that there is no significant difference in the mean achievement scores of students taught with project instructional approach and these taught with conventional method in walling is rejected. This is because the F – calculated (38.421) is greater than the F – critical (3.92). This shows that significant difference exists in the mean achievement scores of experimental and control groups.

Table 7: Mean and Standard Deviation of Experimental and Control Groups in Building Construction Achievement Test in Flooring/finishing

Group	N	Pre-test		Post – test		Post-test gain
		X	SD	X	SD	
Experimental	57	23.05	1.99	29.99	2.07	6.44
Control	58	9.95	8.63	11.78	9.79	1.83

Data presented in Table 7 show that the experimental group had mean achievement score of 23.05 and standard deviation of 1.99 in the pre-test, mean achievement score of 29.99, standard deviation of 2.07 in the post – test making a pre – test post – test gain of 6.94. the control group had mean achievement score 9.95, standard deviation of 8.63 in the pre – test and mean achievement score of 11.78, standard deviation of 9.79 in the post – test making a pre – test post – test gain of 1.83. This implies that the experimental group performed better than the control group.

Table 8: Analysis of Covariance of the Scores of Experimental and Control Groups in Building Construction Achievement Test in Flooring/finishing

Sources of Variation	df	Sum of square	Mean square	F-cal	F.crit
Between Groups	1	1102.115	1102.115	38.421	3.92
Within Groups	113	3241.443	28.685		
Total	114	4343.558			

Data presented in Table 8 show that the null hypothesis of no significant difference in the mean achievement scores of students taught with project instructional approach and those taught with conventional method in flooring/finishing is rejected at 0.05 level of significance. This is because F-calculated (38.421) is greater than F-critical (3.92). This shows that significant difference exists in the mean achievement scores of the experimental and control groups.

4.1 Discussion

The findings of the study revealed that the experimental group, that is, the students taught with project instructional approach performed better than the control group, the students taught with the conventional method in all components of Building Construction. The find-

ings also revealed that the null hypotheses were rejected. This implied that there was significant difference in the mean achievement scores of experimental and control groups in Building Construction. This finding concurs with Sola and Ojo (2007) that project instructional approach produces significant better performance than the conventional method of instruction. The result also corroborates with the findings of Warren and Dennis (2001) that project – based instructional approach produces better academic achievement and retention in students than the conventional method. Instructional methods are particular ways a teacher passes knowledge, instruction or training to the students (Osuala, 2004). Any method of instruction is not effective if at the end of instruction or training, there is no appreciable thing to show that the students have learnt.

4.2 Conclusions and Recommendations

Based on the results of the study, it was concluded that project instructional approach enhances the academic achievement of the experimental group in Building Construction. This accounted for the better performance of the experimental group over the control group. Project instructional approach was found to be better than the conventional method of instruction in enhancing students' academic achievement in Building Construction.

It is recommended that Building Technology teachers in technical colleges should regularly use project instructional approach to enhance students skill acquisition. Seminars and workshops on the application of project instructional approach should be organized for technical teachers to acquaint them on the techniques of using it in teaching skill-oriented subjects.

REFERENCES
Anaele, E. O. (2000). The Role of Practical Work in Teaching Blocklaying and Concreting in Technical Colleges. Nigerian Journal of Education and Technology. Federal University of Technology, Yola, 1, (1), 38 – 44. || Anaele, E. O. & Bargu, B. S. (2010). Effect of Multiple Intelligence – based Instructional Approach on Students Performance of Psychomotor Tasks in Service Station Mechanics Work in Technical Colleges, Journal of Industrial Education and Training. Ambrose Alli University, Ekpoma, Edo State. || Bruldi, A. C. (2000). Multiple Intelligence; Gardener's theory. EMC Digest. Retrieved on March 25, 2006 from http://www.ericdisets.org/1998-//multiple.htm. || Ede, E. O. (1999). Administrative and Teaching Strategic for Increasing the Interest of Senior Secondary School Students in Technical Drawing. Unpublished Ph.D. Thesis, University of Nigeria, Nsukka. || Eyibe, S. C. (2002). Philosophy of Technology Education. Onithsa: Adson Educational Publishers. || Federal Republic of Nigeria (2004). National Policy on Education Lagos: NERDC Press || Knoll, M. (1997). The Project Method: Its Vocational Education Origin and International Development. Retrieved from Journal of Industrial Teacher Education, 34 (3) on December 1, 2006 from http://scholar.lib^ut.edu/ejournal/jite/v/24n3/knoll/html. || National Board for Technical Education, NBTE (2001). Revised national technical certificate and revised advanced national technical certificate programmes for Blocklaying and Concreting trade curriculum and course specification. Kaduna: NBTE. || Okoro, O. M. (2000). Principles and Methods in Vocational and Technical Education. Nsukka: University Trust Publishers. || Osuala, (2004). Foundations of Vocational Education. Enugu: Cheston Agency Ltd. || Rohwer, W. D., Rohwer, C. P. & B – Howe, J. R. (1990). Education Psychology: Teaching for Student Diversity. New York: Holt Reinehart and Wiston. || Sipson, J. A. & Weiner, S.C. (2001). The Oxford English Dictionary. Oxford: Clavendon Press. || Sola, A. O. & Ojo, O. E. (2007). Effects of Project, Inquiry and Lecture – Demonstration Teaching Methods on Senior Secondary Students' Achievement in Separation of Mixtures Practical Test. Educations Research and Review 2 (6), 124 – 132, June 2007. Available online at http://www.academicjournalsorg/ERRISSN1990-3839. || Umunadi, K. E. (2009). A Relational Study of Students' Academic Achievement in Television Technology in Technical Colleges in Delta State of Nigeria. Journal of Industrial Teacher Education, 46, (3), 113 – 131. || Warren, H. H., & Dennis, C. S. (2001). Effects of Instructional Methodologies on Students' Achievement, Attitude and Retention. Proceedings of the 28th National Agricultural Education Research Meetings. New Orleans, L. A. || Wikipedia, (2010). What is Academic Achievement? Retrieved June 10, 2010 from http://www.mluansers.comlqwhatisacademicachievement |