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Effects of Project Method of Teaching on Students' Achievement in Basic Technology

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ABSTRACT
This study investigated the effect of project method and traditional (teacher talk-chalk) method on the achievement of junior secondary school students in Basic technology in Ezeagu local government area, Enugu State. The purpose of the study was to specifically find out the mean achievement scores of students taught Basic technology using project method and traditional (teacher talk chalk) method. Three research questions and four null hypotheses were formulated and tested at 0.05 levels of significance. The study was quasi-experimental design and the population was drawn from one thousand four hundred and forty-six junior secondary school class two students in all the 28 co-educational secondary schools in the area under study. Ten secondary schools and 200 (100 male and 100 female) students were sampled using simple random sampling and stratified random sampling to group the students into two groups; Experimental and Control group. The instrumentation for data collection was made up of twenty-five objective test items of the Basic technology achievement test which was used as pre-test and post-test. The instrument was face and content validated, item analysis and discrimination indices carried out from which the final items for the instrument were selected based on the test blueprint. The reliability coefficient was 0.95 and the data collected was analyzed using two-factor independent group ANOVA at 0.05 significant levels. Findings revealed that there was no difference in mean scores of students taught Basic technology at the pre-test stage. However, the findings revealed that there was significance difference in average mean scores of students taught by project method (66) and those taught by Traditional (teacher talk-chalk) method (42.6) at the post-test. The findings revealed that there was no significant difference in gender between male and female students taught Basic technology by the two methods of teaching (F- cal 978> F-cri 3.84) at 0.05 levels of significance. The study indicated no interaction effect between gender and teaching methods on the students' achievement in Basic technology. The implications of the findings for the use of project method were discussed. Recommendation for the improvement on Basic technology education in Nigeria was proposed.

Key words: project, talk-chalk, teaching, method, technology.

I. INTRODUCTION

Project method of teaching is a type of learner-centred method whereby the learner is in control and responsible for his own action. Being a cooperative learning technique, Newby et al (2006) opined that it involves small groups of learners working together towards a common academic goal or task. This method takes adequate care of those individual differences in learners and helps to overcome and reduce drastically the influences as it affects teaching-learning process by shifting the emphasis of teaching-learning from teacher's activities to learner's activities. However, Borich (2011) argue that project –based learning offers some solutions to the age-old problem of how to give energy and direction to the classroom behaviour of learners. According to Driscoll (in Newby et al, 2006), no longer should learners be viewed as "empty vessels waiting to be filled, but rather active organism seeking meaning." Abimbade (1999) defines project method of teaching as a method that involves investigation and solving of problems either by an individual or small group of people. According to Webb and Palincsar (in Slavin, 2009), project-based learning involves students working in groups to create a report, experiment, mural or other products. Project-based learning begins with an assignment to carry out one or more tasks that lead to the production of a final product - a design, a model, a device or a computer simulation Petty (2004), and (Kochhar, 2009). Borich (2011) agreed that project-based learning communicates to learners the importance of the learning process and not just the product, helps them set goals and use instructional

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groupings to elicit the cooperation of others in completing the project.

Problem of the Study: After the school activities, learners can neither solve real-life challenging problems in the society, nor transfer, demonstrate and experiment the knowledge, principles, theories, values and attitude they have learnt in one situation (that is school) to another situation (life outside school). Consequently, the problem of the study is to find out the effect of project method of teaching in students achievement in Basic technology in junior secondary schools In Ezeagu Local Government Area of Enugu state. This study is significance when administered well to the following; the students, the school, and the contemporary society

Scope of the Study: The study is restricted to the utilization of Project method and Traditional (teacher talk-chalk) method of teaching Basic technology to junior secondary school class two (JSS II)

Research Question:

- What are the mean achievement scores of students taught Basic technology using Project and Traditional (Teacher talk-chalk) method? ,
- What are the mean achievement scores of Male and Female students taught Basic technology using Project method of teaching?
- What are the mean achievement scores of Male and Female students taught Basic technology using Traditional teacher talk-chalk method?

Research Hypothesis formulated to test the significance level of the study at 0.05 or 5%:

- There is no significant difference between the mean achievement scores of Male and Female students taught Basic technology by the two methods.
- There is no significant difference between the mean scores of students taught Basic technology by Project method and those taught by Traditional teacher talk-chalk method.
- There is no significant interaction effect between gender and Teaching methods, on the students' achievement in Basic Technology.

II. RESEARCH METHOD

The study was quasi-experimental research design. This design was adopted because a pure experimental research design was not possible for research in education because of the extraneous variables that must always exist which are beyond the control of the researcher.

Area of the Study: The study covered all the secondary schools in Ezeagu local government Area of Enugu State.

Population of Study: It comprises of one thousand four hundred and forty-six (1446) junior secondary school class two (J SS II) students in all the twenty-eight (28) co-educational secondary schools in Ezeagu local government Area of Enugu State. J SS II students were used because they should have been grounded in introductory technology at J SSI and currently are not in examination class (J SS III).

Sample and Sampling Technique: The sample of the study was taken from the twenty-eight (28) co-educational secondary schools in Ezeagu Local Government Area of Enugu State. Ten secondary schools were randomly selected from the twenty-eight co-educational schools using simple random sample. Twenty (20) students (10 males and 10 females) were randomly selected from each of the ten (10) selected co-educational secondary schools using stratified random sampling technique. This method was chosen so that gender variable could be appropriately represented. Total number of students randomly selected for the study was two hundred (200) comprises of 100 males and 100 females. The 200 students were randomly sampled into two groups; the experimental group and the control group. This was done to give every student equal likelihood of being included in the experimental group.

Instrumentation for Data Collection: The test instrument was made up of twenty-five objective test items of the Basic Technology Achievement Test which was used as pre-test and post-test to measure both lower and higher cognitive and psycho-motor skills of the students in Basic Technology. Two types of lesson plan were used for instruction. The Experimental group was exposed to Basic technology using Project method lesson plan for a period of six (6) weeks while the Control group was taught the same Basic technology using Traditional teacher talk-chalk method lesson plan for the same period of six (6) weeks.

Before the two groups were exposed to Basic technology, the pre-test Basic technology achievement test was administered to both groups in order to determine their entry level. After the duration of six weeks of treatment for both groups, the same Basic technology achievement test was administered to both groups at post-test stage at the same classroom condition.

Score Guide for the test: Each objective test item answered correctly will attract 4 marks. Total marks for the test is 100 marks.

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Experimental Procedure: The students in Experimental group on their own by indicating interest in electricity adopted house wiring as their project task to be experimented. The researcher, in order to control teacher quality variable, used Basic technology teachers in the selected schools as research assistants in reinforcing the students through the use of cognitive and direct instructions, explained key concepts and other necessary components to achieve proper comprehension of the objective of the undertaken project task. The researcher and his assistants then carefully monitored the progress and feedback about achievements and gave guidelines for facilitating completion of the project task by the students themselves. The students planned, executed and evaluated the project task and came-up with the final product- **a circuit of one-way switch controlling two points of lights (two lamps) and a socket-outlet**. However, students in the Control group were taught the same Basic Technology using Traditional Teacher talk-chalk method by the research assistants, but did not experiment any project task.

Method of Data Collection: The Basic Technology Achievement Test instrument developed was used for the data collection. The test instrument was administered to the students in the pre-test and post-test stages, by the research assistants in both groups under the same classroom condition and data were collected from the students' response to the test items.

Method of Data Analysis: The research questions were answered using the mean scores. One-way analysis of variance (ANOVA) test was used to verify the initial abilities of the subjects in Basic Technology in pre-test before they were treated, while the hypotheses were tested using Two-Factor independent Group ANOVA at 0.05 significant levels.

III. PRESENTATION OF RESULT ANALYSES AND DISCUSSION:

Research question 1: What are the mean achievement scores of students taught Basic Technology using Project method and Traditional (teacher talk-chalk) method?

Table 1: The mean scores of students in Experimental group (project method) and Control group (Traditional teacher talk-chalk method) on the pre-test and post-test performances.

	Pre-test			**Post-test**		
variables	Experimental group	Control group	Mean difference	Project method	Traditional method	Mean difference
mean	14.44	14	0.44	66	42.6	23.4
Standard deviation(SD)	2.57	3.02		7.26	4.44	
Total no. of students	100	100		100	100	

Table 1 above shows that students in Experimental group had a higher mean score of **14.44** with SD of **2.57** than students in the control group who had a mean score of **14** with SD of **3.02**. Also inspection of mean difference between the students in Experimental and Control groups with respect to achievement in Basic Technology is **0.44,** which indicates that there is no statistical significant difference between the two groups. This indicated that the two groups of students were in the same entry level before the treatment.

Result in Table 1 also shows that students taught by Project method had a higher mean score of **66** and SD of **7.26** than those students taught by Teacher talk-chalk method with mean score of **42.6** and SD of **4.73**. Table 1 also revealed a significant effect in the learning method with regards to achievement in Basic Technology, indicating a statistical significant difference in mean score of **23.4** between the two methods. Students taught by Project method did better than students taught by Teacher talk-chalk method by a difference mean score of **23.4**.

Research Question 2: What are the mean achievement scores of Male and Female students taught Basic Technology using Project method of teaching, measured by achievement test?

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Table 2: The mean scores of Male and Female students in Experimental group taught Introductory Technology using Project method of teaching.

Variables	Male students	Female students	Mean difference
Mean	66.6	65.1	1.5
Standard deviation	8.1	8.3	
Total number of students	50	50	

Observations from Table 2 above portray no significant difference in mean effect for students in Experimental group with respect to interest in Basic Technology. The table shows that Male students had a mean score of **66.6** and SD of **8.1** while Female students had a mean score of **65.1** and SD of **8.3** in the same Experimental group. Also inspection of mean difference of **1.5,** between Male and Female students, with respect to achievement in Basic technology indicates that there is no statistical significant difference between the mean scores of the two genders. Therefore Project method is gender friendly and independent.

Research question 3: What are the mean achievement scores of Male and Female students taught Basic Technology using Traditional Teacher talk-chalk method, measured by achievement test?

Table 3: The mean scores of Male and Female students in Control group taught Basic Technology using Traditional teacher talk-chalk method of teaching.

Variable	Male students	Female students	Mean difference
Mean	43	42.1	0.9
Standard deviation	4.97	4.87	
Total number of students	50	50	

Result from Table 3 above shows that Male students in control group had a higher mean score of **43** and SD of **4.97** than Female students in the same group with mean score of **42.1** and SD of **4.87**. The table also revealed that there is no statistical significant difference between the mean scores of the two genders (0.9), indicating that traditional teacher talk-chalk method of teaching is also gender friendly. However, inspection of mean scores of Male students taught by Project method and Male students taught by Teacher talk-chalk method in tables 2and 3 respectively revealed that Male students in Project method did better in mean score, **66.6**, than their Male counterpart in Teacher talk-chalk method, **43**, indicating a difference in mean of **23.6** between the two groups under consideration. Likewise the mean difference between Female students in the Project and Teacher talk-chalk methods is **23.** This indicates that there is a statistical significant difference between mean scores of Male and Female students in Project method and Male and Female students in Teacher talk-chalk method.

Research hypothesis for pre-test performances:

1. There is no significant difference between the mean achievement scores of students in Project method and Teacher talk-chalk method, taught Basic technology.

Table 4: Completed One-Way ANOVA Summary pre-test performance table

Variable	SS	dF	Ms	$F_{calculated}$	P	$F_{critical}$
Between groups	2	1	2	0.264	0.05<	3.84
Within groups	1501.68	198	7.58			
Total	1503.68	199				

Result in Table 4 above showed that there was evidence at 0.05 levels of significance, that F-critical is greater than F-calculated (F-cri (**3.84**) > F-cal (**0.264**). Therefore, the null hypothesis is not rejected based on this result; there is no significant difference between the mean achievement scores of students in Project method and Teacher talk-chalk method, taught Basic technology. This revealed that the students in the two groups were at the same

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entry level with regards to academic ability before they were given treatment.

Research hypotheses:

2. There is no significant difference between the mean achievement scores of Male and Female students taught Basic technology.
3. There is no significant difference between the mean scores of students taught Basic technology by Project method and those taught by Traditional teacher talk-chalk method.
4. There is no significant interaction effect between Sex and Teaching methods, on the students' performance in Basic Technology.

Table 5_A: completed two-factor independent group ANOVA summary post-test performance test

source	SS	df	Ms	F-$_{calculated}$	F-$_{critical}$	P
Gender (G)	38.72	1	38.72	1.544	3.84	0.05<
Teaching method (T)	24553.3	1	24553.3	978.903	3.84	0.05<
GxT interaction	5.12	1	5.12	0.204	3.84	0.05<
Subject within G/T group	4916.16	196	25.0824			
Total	29513.3	199				

Table 5_B: Average Mean scores of the two factors

	Project method	Teacher talk chalk method	Average mean
Male	66	43	54.5
Female	65.1	42.1	53.6
Average mean	65.55	42.55	

Results in Table 5_A above shows that there is evidence at 5% levels of significance that the level of factor type of students' gender do not differ. Result of F-critical (**3.84**) is greater than the F-calculated (**1.54**) (F-$_{cri}$ **3.8** >F$_{-cal}$ **1.54**) therefore there is no statistically significant difference in the test results between Male and Female students in the two methods of teaching. Therefore, the null hypothesis is failed to be rejected based on this result.

However, inspection of the average mean score of the student type factor in **Table** 5_B indicates that Male students had average mean score of **54.5** and Female students had average mean score of **53.**6, indicating a difference in average mean score of **0.9**. This indicated that at 0.05 levels of significance, there was no statistical significant difference between the mean achievement scores of Male and Female students taught Basic technology based on this result.

Table 5_A also revealed that at 0.05 levels of significance that the levels of factor type of teaching methods differ. Result of F-calculated is greater than F-critical (F-calculated **978.903** > F-critical **3.84**), which indicates that there was a statistical significant difference between Project method of teaching and Traditional Teacher Talk Chalk method. There is evidence that the teaching methods differ in how effective they were. However, table 5_B revealed that the students in Project method had a higher average mean scores of **65.55** than those students in Traditional teacher talk-chalk method with average mean score **42.55,** indicating a difference in average mean score of **23**. So Project method proved to be significantly more effective. Therefore the null hypothesis is thereby rejected based on this result; project method lead to statistically significantly different marks on the test.

Considering the interaction effect, Table 5_A showed that at 0.05 levels of significance, there is no significant interaction effect between Sex and Teaching methods, on the students' performance in Basic Technology; F-critical is greater than F-calculated (F-cri **3.84** > F- > F-cal **0.204**).

IV. CONCLUSION:

On the basis of the findings in this study, the following conclusions were drawn:

(1) The instructional strategies that teachers employ in teaching Basic science and technology subjects at secondary school level have significant effects on students' achievement. The findings of this study showed that better performance in Basic technology can be achieved through the use of Project method.
(2) Male and Female students were affected positively and equally by the use of Project method in teaching Basic Technology, which indicated that Project method is not gender dependent. There exist no significant difference between the interest of Male and Female students taught with Project method
(3) Project method was significantly better than traditional teacher talk-chalk method in enhancing students' cognitive and psychomotor achievement in Basic technology; development of principles based on their observations, and in addition encourages creativity, inquiry and group work. Therefore, Basic technology teachers should utilize this method for effective teaching and learning.

V. RECOMMENDATION:

From the findings of present study, the following recommendations are made:

- The use of Project method for teaching and learning in our schools should be encouraged. Therefore, project method should be made compulsory for teachers and students in all levels of our educational system (not only in higher institutions), to experiment and demonstrate those theoretical principles taught in classroom in other to overcome the dichotomy between town (community) and school (gown).
- Curriculum planners should integrate and enforce the use of project method into school curricula to enable students to apply, on their own, the skills and knowledge they had learned in the course of their studies to problems they had to solve as experimenters of their skills (that is 'do it yourself').
- The nine (9) year basic education of the Universal Basic Education should be grounded mainly with Project-based learning method in order to catch the learners' young and inculcate in them, the basic knowledge, skills and competence for Nigeria to achieve its National objective.
- There is need for government and other interest groups in education to organize seminars, workshops, conferences as well as in-service training for teachers on methodology of teaching so as to equip and improve on their knowledge and skills, effectiveness and efficiency in classroom, as the case may be.
- Basic technology laboratory should be provided and well equipped in every primary and secondary schools in Nigeria to facilitate good learning environment for students to experiment their knowledge and skills.
- Emphasis should be placed on making teaching and learning to be learner-centered affair as well as teaching for meaningful learning which is what project-based method of teaching presents.
- Male and female students should be encouraged to participate equally in learning science and technology, and role differentiation amongst gender should be avoided.

REFERENCES

[1]. Abimbade, A. (1999). Principles and Practice of Educational Technology (Revised ed.). Ibadan: International Publishers Limited.
[2]. Akinlabi W,I & Adeagbo I,F. (2018). Effect of Project Teaching Method on Student's Academic Achievement in Building/Wood work Trade in Oyo State Government Technical Collages. NAU Journal of Technology and Vocational Education. Vol. 3, No. 1. ISSN: 2449-1764
[3]. Anyawu.N.F, Nzewi.M.U, & Akudolu. L. R. (2004). Curriculum Theory and Planning (Second ed.). Nsukka: University Trust Publishers.
[4]. Allen. (2004). Teacher-Centered Versus Learner-Centered Instruction: Assessing Academic Programs in Higher Educatio n.(online)
[5]. Borich, G. (2011). Effective Teaching Methods: Research-Based Practice. Boston: Pearson Education Inc.
[6]. Chung, J.C.C, and Chow, S.M.K, (2004,) Promoting Student Learning through a Student- Centered, Problem-Based Learning Subject Curriculum. Innovation in Education and Teaching International, Vol. 41, (2), pp. 157–168
[7]. Curtis, D, F. (1971). A Digest of Investigation in the Teaching of Science in the Elementary and Secondary Schools. New York.: Teachers College, Columbia University.

[8]. Davis.C and Wilcock.E (n.d) .Teaching Materials Using Case Studies.[online].
[9]. Dhiman, O. (2007). Foundation of Education. New Dehil, New Dehil: A.P.H Publishing Corporation.
[10]. Eya,E.P, and Chidobi. U.R. (2012). Methods in Teaching: Best Practices. Enugu: God's Will printer Enter.
[11]. Gbaiya, D. (1983). A Textbook of Principles and Practices of Education. Ibadan: Onibonoje Press- Publishers.
[12]. Gillard, G., Leslie, P, &. Rawsthome,P. (2005). Instructional Design Mehodology: an Instructional Design Mthodology that Encourage Students Involvment in Course Design and Implementation. Cape Breton University & Memorial University of New Foundland. pp: 1-15
[13]. Glony, & Frobisher. (1977). Teaching Basic Skills to Infants. London: Wardlock Educational Publishing Co, Ltd.
[14]. Guthrie,J.W. (2003). Encyclopedia of Education (Second ed., Vol. 5). USA: Macmillian Reference.
[15]. G'ulomovna K,Z, Inomovna I,H & Akbarjon Qizi A.M, (2019). Project Method in Teaching English. Europan Journal of Research and Reflection in Educationnal Science. Vol 7, No 12. ISSN:2056-5852
[16]. Heitmann, G. (1996). Project-Oriented Study and Project-Organized Curricula: A Brief Review of Intentions and Solutions. 21 (2), p. 121.
[17]. Huba, & Freed. (2000). Teacher-centered vs. Learner-Centered Paradigms: Comoarison of Teacher centered and Learner centered Paradigms.
[18]. Jacobson, Eggen, Kanchak, & Dulaney. (1986). Methods for Teaching: a Skills Approach. Columbus: Charles E. Merrill Publishing Company, A bell and Howell Company.
[19]. Kochhar S.K (2009). Methods and Techniques of Teaching. Sterling Publisher Pvt Ltd, New Delhi
[20]. Newby,T.J, Stepich,D.A, Lehgmen, J.D, &Russell,J.D. (2006). Educational Technology for Teaching and Learning (Third ed.). New Jersey: Pearson Merrill Prentice Hall.
[21]. Nnachi,R.O. (2007). Advanced Psychology of Learning and Science Enquires. Owerri, Nigeria: TOTAN Publishers
[22]. Onasany,S.A, Fakomogbon,M.A, Shehu.R.A, & Soetan.A.K (2010). Learning Information and Communications Technology Learning in Nigeria. Journal of Artificial Intelligence , 3 (2), 59-66.
[23]. Petty, G. (2004). A practical Guide: Teaching Today (Third ed.). United Kingdom: Nelson Thornes Ltd.
[24]. Prtljaga S & Veselinov D. (2017). The Influence of the Project Method on the Achievement of Young Learners in the Field of Science and Social Studies. Research in Pedagogy, Vol 7, Issue 2. pp 225-264
[25]. Slavin, R.E (2009). Education Psychology: Theory and Practice. Pearson Education Inc; New Jersey The Science Teachers Association of Nigeria.(JSTAN) (2011). Journal of The Science Teachers Association of Nigeria , Special Issue with Support from Education Trust Fund. 46 (1).
[26]. Thomas,J.W. (2000). A Review of Research on Project-Based Learning. San Rafael, CA: Autodesk Foundation.