

EFFECT OF GROUP PROJECT METHOD ON STUDENT'S ACADEMIC ACHIEVEMENT IN CAR BATTERY SYSTEM IN BASIC TECHNOLOGY

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ABSTRACT

The study focused on the effect of group project method on students' academic achievement in car battery system in Basic Technology. Two research questions and hypothesis were used in the study. The researcher adopted non – randomised pre – test, post –test control group quasi experimental design. The population consists of a total of 523 JSS3 students in Gbarainwei and Ogboin - Nedugo community secondary school in Gbarain community in Yenegoa Local Government Area in Bayelsa State. Purposive sampling technique was used for the selection of JSS3B and JSS3A in Gbarainwei and Ogboin – Nedugo community secondary school respectively. The researcher developed and used Car Battery System Achievement Test [CBSAT] in the study. Test-retest procedure was used to determine the reliability of the test items. CBSAT items were administered to 20 students in JSS3 in Phabean group of school, P.H. Using Pearson product moment correlation coefficient, the reliability was calculated to be 0.84 which was considered adequate for the study. Mean was used to answer research question 1, while mean and standard deviation were used to answer research question 2. The null hypothesis 1 and 2 were tested using analysis of covariance [ANCOVA] and t-test respectively at 0.05 level of significance. The study revealed that students taught car battery system in Basic Technology with Group Project Method achieved better than those taught with the conventional lecture method. From null hypothesis 1, it revealed that the difference in academic achievement of students taught car battery system in Introductory Technology with Group Project Method [GPM] and students taught with conventional lecture method [CLM] was not significant at 0.05 level of significance. While null hypothesis 2, showed that there was significant difference in post-test academic achievement of students taught car battery system with GPM and those taught with CLM at 0.05 level of significance. Therefore, Basic technology teachers should incorporate group project based learning in teaching practical related areas. Also, students' learning Basic Technology should be assigned projects to enhance their understanding in the subjects.

KEYWORDS: Group project teaching method, car battery, lecture method, quasi experimental design, Achievement, Basic Technology.

INTRODUCTION

The automobile car battery system is made up of chemical cells that use electrolysis process to generate current. It converts chemical energy to electrical energy. The automobile battery supplies electric current to operate the starting motor and ignition system while starting the engine. The battery is an electrochemical device that produces limited amount of electricity [Crouse, 2007]. The battery case is a moulded plastic and the plates are welded to plate straps to form plate groups. The assembly of plate groups and separators is an element. The element fits into the battery case to form dry cells. The battery, starting and charging systems are interrelated by a continual cycle of converting chemical energy to mechanical energy and then back again. The rotation of the engine drives the alternator, forcing electrical energy into a battery, where it is stored as chemical energy [AMRA, 2014].

Automobile car battery operation system are been taught in Basic Technology under conversion of energy and electrochemical effect. The different parts and method of construction are been explained and demonstrated by teachers in the classroom. Observation shows that most teachers teaching Basic Technology at secondary school level often adopt conventional lecture method in delivering instruction in the classroom. In classroom around the world, teachers lecture, students take notes, and then students are tested on what they have learned [Agboola and Oloyede, 2007].

Lecture method of teaching is the process of giving spoken explanations of the subject that is to be learned [Boundless, 2016]. Lecture is a teaching method where an instructor is the central focus of information transfer. Typically, an instructor will stand before a class and present information for the students to learn [Melissa, 2014]. The lecture method is just one of several teaching methods used in delivering instructions. Other teaching methods are the expository teaching method, guided discovery method, demonstration method, activity teaching method, project based method and so on [MERLOT,2016].

Project method is an educational enterprise in which children solve a practical problem over a period of several days or weeks [Michael, 2016]. Project method of teaching involves assigning a particular work to student or group of students to work on and complete at their spare time and report back to the teacher as when demanded [Agboola and Oloyede, 2007]. The project method provides an excellent opportunity for the complete act of thinking by the students.

Umar, [2013] stated the different types of project methods of teaching which include;

- **Constructive:** When learner has to construct some things related to social life. E.g. charts, models, maps, parcels, and so on.
- **Artistic:** These projects are generally allotted in the aesthetic field of life. E.g. in music, drawing, painting art and culture.
- **Problem – solving:** These projects are given to solve the problems related to any life – situation or related to any object e.g. how to operate bank accounts?
- **Group – work:** A team of students is assigned a work to be performed. E.g. to develop a garden in the school.

Umar, [2013] further stated that project method helps in developing social norms and social values among the learners.

Therefore, there is the need to see the effect of group project based methodology on students' academic achievement in learning car battery system in Basic Technology.

STATEMENT OF PROBLEM

The learning of Basic Technology requires more practical approach for effective performance in the subject. Negedu, Daluba and Noah, [2013] stated over the years, students performance in introductory has not been encouraging. They further stated the poor performance is very evident in the number of students that enrol for science including vocational and technical related subjects at the senior secondary school level which goes further to affect their enrolment at the tertiary institution. Joshua [2014] stated that students performed poorly in subjects like physics and mathematics could only mean that they had not been properly groomed in subjects like Basic Technology at js1, js2, and js3. This may be attributed to the teaching method used by teacher. It is on this note that the Group project method will be introduced to see if students' academic achievement will improve in the subject.

PURPOSE OF THE STUDY

The aim of this study is to;

1. Find out the mean gain academic achievement of students taught car battery system in Basic Technology with group project method and students taught with conventional lecture method.
2. Determine the difference in post –test mean academic achievement of students taught car battery system in Basic Technology with group project method and students taught with conventional lecture method.

RESEARCH QUESTIONS

The following research questions guided the study;

1. What is the mean gain academic achievement of students taught car battery system in Basic Technology with Group Project Method [GPM] and students taught with conventional lecture method [CLM]?
2. What is the difference in post –test mean academic achievement of students taught car battery system in Basic Technology with group project method and students taught with conventional lecture method?

HYPOTHESIS

The null hypothesis was tested at 0.05 levels of significance;

1. There is no significant difference in mean academic achievement of students taught car battery system in Introductory Technology with Group Project Method [GPM] and students taught with conventional lecture method [CLM].
2. There is no significant difference between post – test mean academic achievement of students taught car battery system in Basic Technology with GPM and students taught with conventional lecture method.

METHODS

DESIGN OF THE STUDY

The researcher adopted non – randomised pre – test, post –test control group quasi experimental design. This is because subjects are not randomly assigned to groups. Akuezilo and Agu [2007] stated that in a school setting it is not always possible to use true – experimental design in conducting educational research and at such situation, the researcher resort to using quasi experimental design. Eugene, [2015] stated that it is better for students to remain in their existing natural setting, their usual classrooms, and under the guidance of their regular classroom teachers. Two government secondary schools were selected and used as experimental group E and control group C. Students in both groups were given pre –test on car battery systems in Basic Technology. Experimental group E are given a group project on

the assembly of car battery system, while control group C were taught car battery system with conventional lecture method. Table 1 shows the design of the study.

Table 1: Non-Randomized pre –test, post – test control group quasi experimental design.

GRUOP	Pre – test	Treatment	Post- test
Experimental group E	O ₁	X	O ₂
Control group C	O ₁		O ₂

Where;

O₁ ... Represents pre –test scores for both experimental group E and control group C.

O₂ Represents post–test scores for both experimental group E and control group C.

X --- Represents treatment for experimental group E only.

POPULATION OF THE STUDY

The population consists of a total of 523 JSS3 students in Gbarainwei and Ogboin - Nedugo community secondary school in Gbarain community in Yenegoa L.G.A. in Bayelsa State. These are the government secondary schools available in Gbarain community and were used because basic technology is been offered at JSS3 level. The schools are easily accessible by the researcher.

SAMPLE AND SAMPLING TECHNIQUE

Purposive sampling technique was used for the selection of JSS3B and JSS3A in Gbarainwei and Ogboin – Nedugo community secondary school respectively in Gbarain community in Yenegoa L.G.A. in Bayelsa State. JSS3B students in Gbarainwei government secondary school were used as experimental group E to be taught car battery system with group project method. While JSS3A students in Ogboin- Nedugo community secondary school were used as control group C learning car battery system with conventional lecture method. Experimental group E consist of a total of 17 students [10 males and 7 females], while control group C consist of a total of 23 students [15 males and 8 females].

INSTRUMENT FOR DATA COLLECTION

The researcher developed Car Battery System Achievement Test [CBSAT] in the study. The CBSAT was used to assess the effect of GPM on student’s achievement in car battery system in Basic Technology. The CBSAT is a 15 items multiple choice test drawn from various electrochemical generation of electricity as recommended by junior WEAC syllabus. Each item has in the instrument four response options ranging from A to D, with only one as the correct answer.

VALIDITY OF THE INSTRUMENT

The research question, hypothesis and CBSAT items were face validated by two experts from the Science department in Best Brain International Secondary School.

The experts checked if;

1. The questions were in line with the lesson content and recommended scheme of work in WEAC.
2. The statements were clear and easy for students to understand.

Recommended changes were made by the experts before final copy was produced and used for the study.

RELIABILITY OF THE INSTRUMENT

Test-retest procedure was used to determine the reliability of the test items. CBSAT items were administered to 20 students in JSS3 in Phabean group of school, Port Harcourt. After two weeks interval, the same test items were administered to the same group of students and their scores were collected and recorded. Using Pearson product moment correlation coefficient, the reliability was calculated to be 0.84 which was considered adequate for the study.

EXPERIMENTAL PROCEDURE

The researcher observed the following procedures in carrying out the treatment;

1. The researcher briefed a regular Basic Technology teacher on how to carry out the project method on car battery system in experimental group E students after obtaining permission from the Principal of the school.
2. The students in experimental group E and control group C were given pre- test on CBSAT to check their entry equivalence.
3. The students in experimental group E were arranged into three smaller groups of A, B, and C. Each group were provided with car battery case, connecting wires, acids, battery terminal and voltage regulator. The researchers monitored the research assistant on observing the procedures in the lesson plan. Proper safety measures were observed in carrying out the project.
4. The experiment lasted for two weeks. At the first week, a group leader was appointed in each group. The students were introduced and taught on concept of car battery system for 90 minutes double period following school time table schedule. In the second week, the students mixed and coupled the battery case system as they follow the instruction of the research assistant. Errors made by the students were corrected and necessary precautions were observed.
5. At the end of the treatment given to the students in the second week, a post – test was administered to the students in experimental group E and control group C. The post – test lasted for 90 minutes and the scores obtained were collected and recorded.
6. In other for the students not feeling that they are been retested and used for a study, the pre –test questions numbering pattern and options was rearranged and given as post –test to the students.

METHOD OF DATA COLLECTION

The pre- test scores for both experimental group E and control group C taught car battery system in Basic Technology were collected and recorded. At the end of the treatment, post – test was administered to both experimental group E and control group C. The post – test scores were collected and recorded.

METHOD OF DATA ANALYSIS

Mean was used to answer research question 1, while mean and standard deviation were used to answer research question 2. The null hypothesis 1 and 2 were tested using analysis of covariance [ANCOVA] and t-test respectively at 0.05 level of significance. ANCOVA was used to neutralize the initial group difference. T-test was used because of the small sample size.

RESULTS

RESEARCH QUESTION 1

What is the mean gain academic achievement of students taught car battery system in Introductory Technology with Group Project Method [GPM] and students taught with conventional lecture method [CLM]?

Table 2. Mean gain academic achievement of students taught car battery system in Basic Technology with Group Project Method [GPM] and students taught with conventional lecture method [CLM].

Groups	Teaching Methods	Number of subjects	Pre – test Mean	Post – test Mean	Mean Gain
Experimental group E.	GPM	17	42.1	71.1	26.9
Control group C.	CLM	23	47.7	49.8	
TOTAL		40	5.6	21.3	26.9

Result from table 1 showed that the pre –test and post -test scores of students taught car battery system in Basic Technology using GPM and CLM are 42.1;71.1 and 47.7;49.8 respectively. The mean gain was then calculated to be 26.9.

RESEARCH QUESTION 2

What is the difference in post –test mean academic achievement of students taught car battery system in Basic Technology with group project method and students taught with conventional lecture method?

Table 3. Post –test mean academic achievement of students taught car battery system in Basic Technology with GPM and students taught with CLM.

Groups	Teaching Methods	Number of Subjects	Mean	Standard Deviation
Experimental Group E.	GPM	17	71.1	14.8
Control Group C.	CLM	23	49.8	17.4
Total		40	21.3	32.2

The result from table 2 showed that the mean and standard deviation of post – test scores of students taught car battery system in basic technology using GPM and CLM are 71.1;14.8 and 49.8;17.4 respectively. From the difference in the mean score, it appears that students taught car battery system in basic technology with GPM achieved higher than students taught with CLM.

HYPOTHESIS 1

There is no significant difference in mean academic achievement of students taught car battery system in Introductory Technology with Group Project Method [GPM] and students taught with conventional lecture method [CLM].

Table 4. Analysis of Covariance of students taught car battery system in Basic Technology with Group Project Method [GPM] and students taught with conventional lecture method [CLM].

Source of variance	DF	Sum of squares	Mean squares	F- Cal	F- Crit.	Significance Level	Decision
Between groups	1	-92456.3	-92456.3	-327.4	7.35	0.05	Accept
Within groups	39	11014.8	282.4				
Total	40	-81441.5					

From the table, critical F value at 0.05 level of significance, 1 df for numerator and 39 df for denominator is 7.35. Since critical F value [7.35] is greater than the computed F value [-327.4] the hypothesis is not significant at 0.05 level of significance. On these bases the null hypothesis will be accepted.

HYPOTHESIS 2

There is no significant difference between post – test mean academic achievement of students taught car battery system in Basic Technology with GPM and students taught with conventional lecture method.

Table 5: Analysis of t-test of post-test mean academic achievement of students taught car battery system in Basic Technology with GPM and students taught with CLM.

Subject	Teaching Method	N	Mean	Standard Deviation	Level of significance	Degree of Freedom	T-cal	T-table	Decision
Experimental group E	GPM	17	71.1	14.8	0.05	38	4.2	2.0	REJECT
Control group C	CLM	23	49.8	17.4					

From table 5, critical t- value of 2.0 at 0.05 level of significance, was less than t-calculated value of 4.2. As a result, the null hypothesis was rejected.

DISCUSSION OF FINDINGS

Based on the result of the findings, calculated mean gain of 26.9 in research question 1 implies that the students taught car battery system in Basic Technology with group project method performed better than those taught with the conventional lecture method. This is consistent with the report of Umar, [2013] that the project method helps in growing knowledge very effectively as a result of close cooperation on social participation.

Findings of research question 2 revealed that students taught car battery system in Basic Technology with PBM achieved higher than those taught with CLM. This may be as a result of the team work demonstrated by the students during the execution of the project.

The first null hypothesis showed that mean academic achievement of students taught car battery system in Basic Technology with Group Project Method [GPM] and students taught with conventional lecture method [CLM] was not significant at 0.05 levels of significance. While the second null hypothesis revealed that the difference in post-test mean academic

achievement of students car battery system in Basic Technology with GPM and those taught with CLM was significant at 0.05 level of significance.

Therefore, it implies that the group project method was more effective than the conventional lecture method in teaching and learning of car battery system in Basic Technology.

CONCLUSION AND RECOMMENDATION

The purpose of the research was to determine the effect of group project method in teaching car battery system in Basic Technology in government secondary schools in Gbarain community. The study revealed that students taught car battery system in Basic Technology with group project method achieved better than those taught with the conventional lecture method. The difference in academic achievement of students taught car battery system in Basic Technology with Group Project Method [GPM] and students taught with conventional lecture method [CLM] was not significant at 0.05 levels of significance. Also, the difference in post-test mean academic achievement of students taught car battery system in Basic Technology with GPM and those taught with CLM was significant at 0.05 level of significance. Therefore, in the study of car battery in basic technology group project method is more effective.

RECOMMENDATIONS

The following recommendations were made;

1. Basic technology teachers should incorporate group project based learning in teaching practical related areas.
2. Students learning basic technology should be assigned projects to enhance their understanding in the subjects.

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