

# **EFFECT OF ACTIVE LEARNING ON STUDENTS' ACADEMIC ACHIEVEMENT IN AUTOMOBILE IGNITION SYSTEM IN RIVERS STATE TECHNICAL COLLEGES.**

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## **ABSTRACT**

The study focused on the effect of active learning strategy on students' academic achievement in automobile coil ignition system. One research question and one hypothesis were used in the study. The topic used for the test is automobile ignition system. It is also limited to the use of lecture teaching strategy and the active learning strategy. Two group randomized pre-test and post-test control group design was used in the study. Experimental group A are taught automobile ignition system [AIS] with active learning strategy [ALS], while control group B are taught with the conventional learning strategy [CLS]. The population consists of 245 technical school students from VOC 3 offering automobile technology in Rivers State Technical Colleges. Random sampling technique was used to select 13 VOC 3 students offering automobile technology in Government Technical College, Eleogu, Rivers State. The students were randomly assigned to experimental group A and control group B. Experimental group A consist of a total of 7 students [ 6 males and 1 female], while control group B consist of a total of 6 students [ 4 male and 2 female]. The researcher developed automobile ignition system test [AIST] instrument. The test instrument consists of twenty multi choice questions developed from automobile technology in NABTEB syllabus. Two experts from Federal Science and Technical College, Ahoada, validated the instruments. Test –retest procedure was used to obtain the reliability of the instrument. AIST instrument was administered to respondent in automobile unit in Federal Science Technical College, Ahoada. Using Pearson Product Moment Correlation Coefficient, the reliability was calculated to be 0.83 which was considered adequate for the study. The scores obtained from the pre- test and post-test were collected and recorded. Mean and standard deviation were used in answering the research questions. The hypothesis was tested, using t-test at 0.05 level of significance. The study revealed that there was significant difference in the mean academic achievement of students taught automobile ignition system using ALS and those taught with CLS. The difference in academic achievement between those taught with ALS and those taught using CLS was found to be significant at 0.05 level of significance. Therefore, for effective teaching of automobile ignition system, active

teaching strategy should be used. Finally, it was recommended that teachers in automobile units in technical institution should apply active learning strategy in teaching students.

**KEYWORDS:** Active learning strategy, conventional lecture strategy, automobile ignition system and technical institution.

## INTRODUCTION

The purpose of the ignition system is to ignite the compressed air-fuel mixture in the engine combustion chambers. This should occur at the proper time for combustion to begin. To start combustion, the ignition system delivers an electric spark that jumps a gap at the combustion-chamber ends of the spark plugs. The heat from this arc ignites the compressed air-fuel mixture. The ignition system may be either a contact-point ignition system or an electronic ignition system [Crouse, 2007]. Ignition system includes the battery, ignition switch, ignition coil, ignition distributor, secondary wiring, and spark plugs. Karim, [2016] stated that the coil is a simple device essentially a high voltage transformer made up of wire. One coil of wire is called the primary coil and wrapped around it is the secondary coil. The ignition coil is a step-up transformer that raises the battery voltage to a high voltage that may reach 25000 volts. In some electronic ignition systems, the voltage may go up to 47000 volts or higher.

The spark plug has two solid-metal conductors called electrodes positioned to form a gap. The gap is between the insulated centre electrode and the ground electrode. The spark plug jumps the gap to ignite the compressed air-fuel mixture in the engine cylinders. The ignition system consists of two separate but related circuits: the low-voltage primary circuit and the high-voltage secondary circuit. The ignition coil has two windings. The primary winding of a few hundred turns of heavy wire is a part of the primary circuit. The secondary windings of many thousand turns of fine wire are part of the secondary circuit. When the ignition key is on and the contact point closed, current flows through the primary winding. This produces a magnetic field around the primary windings in the coil. When the contact point opens, current flow stops and the magnetic field collapse. As it collapses, it cuts across the thousands of turns of wire in the coil secondary winding. This produces a voltage in each turn. These add together to produce the high voltage delivered through the secondary circuit to the spark plug [Crouse, 2007].

Ignition system is been taught under automobile electrical work in technical colleges in Nigeria. Students are taught on knowledge of ignition system, draw coil ignition system of a four cylinder engine, and draw a coil lamp circuit and the alignment of head lamp. NABTEB [2011] revealed that student performances were poor after they are tested in these areas. Their weaknesses include: irrelevant answers to the questions, wrong definition of technical terms, poor computation skills and grammatical expression. Also, the teaching strategies used by teachers in delivering instructions may affect students' performances in the subject. Some of such teaching strategies are project based learning, problem based learning, active learning, case study, lecture, discussion and so on.

For many years, the lecture method was the most widely used instructional strategy in college classrooms. The advantage of lecture approach is that it provide a way to communicating with a large amount of information to many listeners, maximizes instructor control and is non- threatening to students. The disadvantage is that lecturing minimizes feedback from students understanding and comprehension, and often disengages students from the learning

process causing information to be quickly forgotten. Problem- based and project- based learning involve giving task to students and allowing the students to find out solutions on their own.

Active learning is a learning environment that allows students to talk and listen, read, write, and reflect as the approach course content through problem–solving exercises, informal small groups, simulations, case studies, role playing, and other activities. MERLOT, [2016] defines active learning as anything that students do in a classroom other than merely passive listening to an instructors lecture. Donald and Jenifer, [2016] stated that active learning is anything that students do in the classroom other than mere passive listening to an instructor’s lecture. This includes everything from listening practices which help the students to absorb what they hear, to short write writing exercises in which students react to lecture materials, to complex group exercises in which students apply course materials to real life situation and new problems. Students may react positively when taught practical subject with active learning strategy.

There is therefore the need to see the effect of active learning instructional strategy on students’ academic achievement in automobile coil ignition system in government technical college, Rivers State.

### **PURPOSE OF THE STUDY**

The aim of the study is to;

1. Ascertain the effect of active learning strategy on students’ academic achievement in learning automobile ignition system in Rivers State Technical College.

### **SCOPE OF THE STUDY**

The study is limited to VOC 3 students in automobile option in Government Technical College in Rivers State. The topic used for the test is automobile ignition system. It is also limited to the use of lecture teaching strategy and the active learning strategy.

### **RESEARCH QUESTION**

The researcher adopts the following research question;

1. What is the effect of active learning strategy on students’ academic achievement in learning automobile ignition system in Rivers State Technical College?

### **HYPOTHESIS**

The null hypothesis was tested at 0.05 level of significance.

There is no significant difference in the post –test scores of students’ taught automobile ignition system with active learning strategy and those taught with the conventional lecture strategy in Rivers State Technical Colleges.

### **METHODS**

#### **RESEARCH DESIGN**

Two group randomised pre-test and post–test control group design was used for the study. The design was used because the subjects were randomly assigned to experimental group A

and control group B. Experimental group A are taught automobile ignition system [AIS] with active learning strategy [ALS], while control group B are taught with the conventional learning strategy [CLS]. Both experimental group A and control group B will be given pre – test to check their previous knowledge on automobile ignition system. After treatment is given to the experimental group, a post–test was given to both groups. The design table is shown on table 1 below.

**Table 1: Randomised Pre-test and post-test control group experimental design.**

Groups	Pre-test	Treatment	Post-test
Experimental group A taught with ALS	O <sub>1</sub>	X	O <sub>2</sub>
Control group B taught with CLS	O <sub>1</sub>		O <sub>2</sub>

Where;

O<sub>1</sub>----- Represents pre-test given to both experimental group A and control group B.

O<sub>2</sub>----- Represents post –test given to both experimental group A and control group B.

X----- Represents treatment given to experimental group A students taught with ALS.

### POPULATION OF THE STUDY

The population consists of 245 technical school students from VOC 3 offering automobile technology in Rivers State Technical Colleges. The population was obtained from their heads of department in automobile unit in the various institutions.

### SAMPLE AND SAMPLING TECHNIQUE

Random sampling technique was used to select 13 VOC 3 students offering automobile technology in Government Technical College, Eleogu, Rivers State. The students were randomly assigned to experimental group A and control group B. Experimental group A consist of a total of 7 students [ 6 males and 1 female], while control group B consist of a total of 6 students [ 4 male and 2 female].

### INSTRUMENT FOR DATA COLLECTION

The researcher developed automobile ignition system test [AIST] instrument. The test instrument consists of twenty multi choice question developed from automobile technology in NABTEB syllabus. The researcher in preparing the AIST instrument prepared a table of specification blue print to guide the test items. The design of the test blue print was guided by the guidelines in the NABTEB scheme in VOC 3 students.

Twenty [20] items were subjected to both face and content validity. The test items were validated by checking the items against NABTEB syllabus in automobile ignition system. A total of two experts from Federal Science and Technical College, Ahoada, validated the instruments. They checked if the research question is in line with the purpose of the study and also if the test instrument actually complied with the content and language pattern of the study.

Test –retest procedure was used to obtain the reliability of the instrument. AIST instrument was administered to respondent in automobile unit in Federal Science Technical College, Ahoada. After two weeks interval, the same test instruments were given to the same set of students. Their score were obtained and recorded. Using Pearson Product Moment Correlation Coefficient, the reliability was calculated to be 0.83 which was considered adequate for the study.

## **EXPERIMENTAL PROCEDURE**

The researcher observed the following procedure in carrying out the experiment;

1. The researcher obtained permission from the school authority to use their students for the study.
2. The researcher appointed a regular automobile instructor as a research assistant.
3. The research assistant was briefed on how to follow the guidelines of ALS lesson plan.
4. Before the commencement of the treatment, a pre –test was given to both experimental group A and control group B.
5. The treatment lasted for two weeks with a total of 90minutes double period allocated per week.
6. Students were provided with coil ignition system of a Toyota car. The student make diagrams, examined the various parts of the Toyota coil ignition system. This was taught in the first week of the treatment.
7. The alignment of car head lamp of a Toyota car was examined by the students. The students looked into the parts as the teacher give explanation to the functions of the parts.
8. Two days interval at end of the lessons, the researcher administered a post-test for both experimental group A and control group B. Their scores were collected and recorded.

## **METHOD OF DATA COLLECTION**

The scores obtained from the pre- test and post-test were collected and recorded. The pre-test and post-test were administered to experimental group A and control group B for two hours.

## **METHOD OF DATA ANALYSIS**

Mean and standard deviation were used in answering the research questions. The hypothesis was tested, using t-test at 0.05 level of significance.

## **RESULTS**

### **RESEARCH QUESTION 1**

What is the effect of active learning strategy on students' academic achievement in learning automobile ignition system in Rivers State Technical College?

**Table2. Mean and standard deviation of students taught active learning strategy and those taught conventional lecture strategy in Rivers State Technical College.**

GROUPS	Teaching Strategy	Numbers of students	Pre- test mean	Post- test mean	Standard deviation	Mean gain
Experimental group A	ALS	7	39.9	79.4	13.2	34.2
Control group B	CLS	6	36.7	42.0	8.9	

The data presented in table 2 shows that students in experimental group A had a pre-test mean Score of 39.9, post- test mean score of 79.4 and a standard deviation of 13.2. The control Group on the other hand had a pre- test mean score of 36.7, post- test mean score of 42.0 and a standard deviation of 8.9. The mean gain was calculated to be 34.2. This showed that students in experimental group A performed better than students in control group B in automobile ignition system.

### HYPOTHESIS

There is no significant difference in the post –test scores of students’ taught automobile ignition system with active learning strategy and those taught with the conventional lecture strategy in Rivers State Technical Colleges.

**Table 3: Analysis of t-test of automobile ignition system.**

Groups	Teaching Strategy	Post- test mean	Standard deviation	N	df	T- cal	T- tab	Decision
Experimental group A	ALS	79.4	13.2	7	11	19.5	1.796	Reject
Control group B.	CLS	42.0	8.9	6				

The data presented in table 3 showed that the t- calculated value of 19.5 is greater than the t- tabulated value of 1.796 at 0.05 level of significance. This resulted in the rejection of the null hypothesis, which implies that there is a significant difference in the academic achievement of students taught automobile ignition system with ALS and students taught with conventional lecture strategy.

### DISCUSSION OF FINDINGS

The result from research question 1 revealed that students taught automobile ignition system with ALS achieved higher than those taught with CLS. This goes to show that the ALS method was more effective in the teaching of automobile ignition system. MERLOT, [2016] stated that active learning improves students understanding and retention of information and can easily be effective in developing higher order cognitive skills such as problem solving and critical thinking. The difference in academic achievement between those

taught automobile ignition system with ALS and those with CLS was found to be significant at 0.05 level of significance.

## **CONCLUSION AND RECOMMENDATION**

The study revealed that there was significant difference in the mean academic achievement of students taught automobile ignition system using ALS and those taught with CLS. The difference in academic achievement between those taught with ALS and those taught using CLS was found to be significant at 0.05 level of significance. Therefore, for effective teaching of automobile ignition system, active teaching strategy should be used. Finally, it was recommended that teachers in automobile units in technical institution should apply active learning strategy in teaching their students.

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