



Effects of scenario-based learning on Nigerian certificate of education (N.C.E.) students' achievements in auto-electrical system in north-eastern, Nigeria

Isah Aliyu Mohammed*

Department of Technical Education, School of Vocational and Technical Education, Abubakar Tatari Ali Polytechnic Bauchi, Nigeria

Abstract

This research examined the Effects of Scenario-Based Learning on Students' Achievement and Interest in Auto Electrical System among Nigerian Certificate in Education (N.C.E) Students in Colleges of Education in North East, Nigeria. The study is guided by five objectives and five research questions. The study adopted a quasi-experimental control group design to examine the variables under investigation. Auto Electrical System Academic Achievement Test (AESAAAT) was used for data collection and was administered to 70 Auto electrical students of National certificate in Education Technology (N.C.E Tech.) in Aminu Saleh College of Education Azare and Abubakar Tatari Ali polytechnic Bauchi. Data collected was mean and standard deviation, while the research hypotheses were tested using paired sample t-test and analyzed using statistical package for social sciences (SPSS). The findings of the study revealed that students' academic achievement in auto electrical system in the experimental and control group was almost similar during pre-test, and the students' academic achievement in auto electrical system in the experimental group was higher than that of the control group in the post-test. The present study recommends that the use of scenario based learning should be adopted in teaching auto electrical system and other automotive courses in north-east Nigeria so as to improve academic achievement and interest of students.

Keywords: scenario-based learning, students achievements, auto-electrical system

Introduction

Automobile technology is one of the courses offered in Nigerian, colleges of education technical. Almost all the members of the society benefit from the products of Automobile technology. Automobile technology programmed at the colleges of education is designed to produce skilled builders' automobile industry among others. Auto electrical system is an aspect of vocational technical education. Vocational technical education is an education for work. According to Uwaifor, (2010) vocational technical education is any form of education whose purpose is to prepare person for employment in an occupation or group of occupations. Dolman, (2013) [23] Stated that vocational technical education is the acquisition of skills and techniques in chosen occupation or profession to enable an individual earn a living. Becker, (2011) [14] viewed vocational technical education as an aspect of education which leads to the acquisition of practical and applied skills. Auto electric system is one of the courses offers by NCE students, which have contributed greatly to the high economic standard of most of the developed countries of the world. The extent to which the teachers are effective in successfully guiding the students can be judged from the results of their teaching on the student's achievement. Teaching effects are positive if they produce lasting effects for development of technical knowledge, skill, attitude and interest in the students (Ahmed, 2016). Effective teaching of auto electrical system should not only prepare students for success at examinations, but should also create lasting effects and usable impression on them, such as acquisition of manipulative skills and enhancement of students' achievement and interest in technology education (Candy, 2017) [17].

However, today innovation is needed in every area of life as it is needed in the field of education and it is not surprising that traditional teaching methods that are mainly based on an objectivities approach are considered unsatisfying within this context (Altaher, 2011) [9]. Auto-mobile teachers who are one of the most outstanding elements of education should possess skills of being able to implement contemporary approaches that would enable student's to carry out active learning.

It is believed that learning outcomes of Auto-mobile education students are improved with active learning techniques (William, 2013). This studies also stress that students' should be responsible from their own learning processes during teaching process where as teachers should be guided in this process Rose, (2012) emphasized that the most fundamental problem encountered during learning-teaching process is that students memorize the new information and they fail to convey what they have learned into new situation.

Most of the system in auto-mobile field has been controlled electrically. That is why students of auto-mobile program have to master the electrical system. Unfortunately, based on the research carried out by Rose, (2020) on auto-mobile electrical system result shows that Auto-electrical System is the difficult subjects for auto-mobile students, to improve the student achievement and interest in auto-electrical system, a Scenario based Learning have to be introduced to facilitate the learning of Auto-electrical System.

The importance of Auto-electrical System is enormous for effective teaching and learning especially among Nigerian Certificate in Education (N.C.E) students'. Effective teaching of Auto-electrical System can then be conceived as the ability of a professional teacher to utilize appropriate learning strategies in guiding students' to acquire technical

skill, idea and concept with a view to attaining the instructional objectives of the lesson and at the same time lay solid foundation for the continue achievement and interest of students' in Auto-electrical System (Altaher, 2011). Active learning is a much more effective process than a process that teacher spoon feeds students.

Etlinger, (2014) ^[27] contented that the usefulness of concepts in motor vehicle trade especially in auto-mobile electrical works in the professional training; electrical/electronic aspect should be highly emphasized. Consequently, there is great need for motor auto electrical system in this technological age to diagnose their learning difficulties. The electrical/electronic systems in the motor vehicle are now diagnosed using electronic gadgets like computer. Automobiles electrical technologies were used for effective operation of modern vehicles, the skills of distributing power to other parts of the vehicle but automobile electrical works have become imperative and today's electrical system performs sensor functions for indispensable in the training of motor vehicle technologies, for efficient operations of the vehicle (Dolman, 2012).

Becker (2011) ^[14] Content that Scenario-based learning is an instructional approach designed to give students' the opportunity to develop knowledge and skill. Scenario-based Learning should not only prepare students' for success at examination but should also create lasting effects on the students to sustain their lasting interest Elisha, (2014) stated that education is the light that shows the mankind the right direction. Learning is not just making a student literate but also adds rational thinking knowledge and self-sufficiency. Learning develops students' potential which includes high level of creativity in analyzing and presenting knowledge in effective ways (Ali, 2012).

Infarct Scenario-based Learning (SBL) uses interactive scenarios to support active learning strategies such as problem based or case based learning. Hayden & Olegang, (2011) ^[34] content that Scenario-based Learning involves student working their way through a story line, usually based around and ill-structured or complex problem, which they are required to solve. Scenario-based Learning is a popular instructional strategy that uses the active learning appropriate, as it is in the real-life situation (John, 2016) ^[35].

Over view of Electrical and Technology Education

Auto electrical system is an aspect of vocational technical education. Dolman, (2013) ^[23] Stated that vocational technical education is the acquisition of skills and techniques in chosen occupation or profession to enable an individual earn a living. Becker, (2011) ^[14] viewed vocational technical education as an aspect of education which leads to the acquisition of practical and applied skills. Auto electric system is one of the courses offers by NCE students, which has contributed greatly to the high economic standard of most of the developed countries of the world.

Education, particularly vocational technology education, is the factory for the production of the needed technologists, technicians and craftsmen who are required to turn the nation economy by creating and ushering in desired technological advancement, which is very much required for the elevation of Nigeria from consumer nation to a producer nation (developing nation to a developed nation). Technical education has been identified as a very important base for technological development of any nation (Bhuwance, 2019). Policy makers have called for improvements in the

academic achievement of Students, many educational reformers, particularly those associated with the standard movement hold that the key to improved student's achievement in technical colleges lies on the teaching strategies.

The major objectives of technology education programmed in Nigeria according to Okoli (2010) are:

1. To meet the man power needs of the nation secondary and technical institution.
2. To assist in increasing the occupational options available to youth after graduation.
3. To help motivate the student in skill learning for occupation through the technology teacher.

Auto Electrical System

The system in a motor vehicle that furnishes the electrical energy to crank the engine for starting, recharge the battery after cranking, create the high-voltage sparks to fire the compressed air-fuel charges, and power the headlamps, light bulbs, and electrical accessories. The vehicle electrical system includes the battery, wiring, starting motor and controls, generator and voltage regulator, electronic ignition, and electronic fuel metering (Cratty, 2013).

In Auto-electrical System, computerized electronic engine control system, electronically displayed driver information system, various types of radios and sound systems, and many other electrically operated and electronically controlled systems and devices. Mogaji, (2010). Auto-electrical work with alternating-current generator, Commutation, Computer, Conductor (electricity), Control systems, Current measurement, Direct current, Direct-current motor, Electric switch, Electronics, Fuse (electricity), Generator, Spark among others. Cratty, (2013) ^[20] stated that Automobile engineering is a branch study of engineering which teaches manufacturing, designing, mechanical, mechanisms as well as operations of automobiles.

Scenario-based learning and Students achievements

Scenario based learning are the principles and method use for instruction to engage learners in diverse ways, which is not limited to demonstration memorization, participation, brain storming among others. Okoli, (2010) Teachers are the main authority figure in a learning centered; Students are view as empty vessels who passively receive knowledge from their teachers through lectures and direct instruction with an end goal of positive result from testing and assessment. Teaching methods are used to impact knowledge on students, they are the means by which the teacher attempts to impact the desired learning or experience. The choice of a particular method of teaching by teacher determined the number of factors which includes the contents to be taught the objectives which the teacher plans to achieve, availability of teaching and learning resource and the ability and willingness of the teacher to improvise (Lee, 2014) ^[37].

Learning is still an authority figure in students centered; in Scenario-based Learning students play an equally active role in the learning process. The teachers primary role is to coach and facilitate student learning and overall comprehension of materials and to massive students learning through both formal and informal forms of assessment. Hecht, (2013) comment that in student centered classroom teaching and assessment is connected because

student learning is continuously measured during teacher instruction.

Advancement in technology has propelled the education sector in the last few decades' different technology to aid students in the classroom learning. Abdullahi, (2010) comment that learning styles in Technical Education required a physical achievement. Important effect on teachers arises from assessment practices. Al-hakim, (2011) [7] stated that instructional materials influence the continuing professional development of teachers in several ways. The measurement of student achievement is a challenging undertaking regardless of the scope of the domain of measurement. Educators are to engage in learning techniques which will bring about interaction among student and improved their relationship with individual in the classroom situation (Robert, 2017).

Students are urged to engage with the real world, analyzes anything that happens in different life spheres. These methods have the purpose to improve the quality of education and involve students in educational process. Williams & Troy, (2013) stated that Scenario based Learning is a system of education that leads to progress and development. The use of technology in education is necessary because students are known as digital natives. The new content of teaching is designed to form culture and independent of thinking among student. Nisa, (2017) confirms that Scenario-based Learning method can make the lesson concept interesting and can take students closer to their day to day world. There has been an increasing concern, the world over for the improvement of the quality of life of the people and for the achievement of a better Career for students, through education. As a corollary to this concern various measures have been taken in many countries to the implication of policies for the recognition of education as a basic human right (Harris, 2013).

Education plays a pivotal role to the peace, social, political and economic growth of any nation therefore, effective learning is essential. Effective learning does not solely revolve around getting the vast amount of knowledge into the learner, it delves deeper into the technicalities, ensuring that teaching is based on assisting the learners progress from one level to another while allowing the learner at the same time to slowly evolves and make sense of the content independently. Choosing a teaching method is best aimed at this teaching session. Instructional model teaching methods are commonly known as innovative modern teaching methods that involve the use of technology, animation special effect and are generally learner self-directed and interactive in nature (Hecht, 2013).

Systematic literature review by Nisa, (2017) related to Scenario-based Learning methods focused on the following:

1. Constructive aspects on problems based learning critical training and team based Learning.
2. Influence on teaching methods on knowledge retention and learners Achievement/grade and
3. Specific to a particular group of learners.

Scenario-based learning enables the male and female students' to engage in robust cognitive and social task. Scenario helps students' to acquire information, ideas, skills, values, and way of thinking and means of expressing themselves (Williams & Troy, 2013). Scenario-based learning is the specific instructional plans which are designed according to the concerned learning theories. It

provides a comprehensive blue print for curriculum to designed instructional materials, planning.

Joyce, (2014) identifies some important of Scenario-based learning:

1. It creates an effective interaction between the teachers and the students'
2. It is clear and specified roles for teachers and students'.
3. Foster and strengthen the cognitive structure of the students'.
4. It raises the student's level of aspiration, motivation and interest in learning.
5. It encourage active participation of both the male and female students' in class

Element of Scenario-based learning

1. Syntax: It includes the major components and features of Auto-electrical system
2. Principles of creation: Tell the teacher how to regard the learner and how to respond to what the learner does during the use of Scenario-based learning. This element is concerned with the teacher's reaction to the student's response.
3. The social system: Describes the interactions between students and teachers. Scenario-based learning will have its own social system and rules of engagement. This portion concerns the interactive roles and relationships between the teacher and the students, expected norms, and which student behaviors should be recorded. There is still other Scenario-based learning that required shared roles, whereby teachers and students share roles equally.
4. Support system: defines the supporting conditions required to implement the scenario successfully. Support refers to any additional requirements beyond the usual general human skills and capabilities, that care needed to implements the scenario. This component relates to any additional requirements beyond those generally possessed by teachers or found in schools. The requirements that needed to make this scenario work are special skills or knowledge.

Scenario-based learning is an entrance ticket for anyone who steps into the learning world, because everyone needs to practice Scenario-based learning is presented making by using both brain and hand at the same time (Chuang, 2015) [19].

Research Objectives

The main objective of this study is to examine the Effects of Scenario-Based Learning on Students' Achievement and Interest in Auto Electrical System among Nigerian Certificate in Education (N.C.E) Students in Colleges of Education in North East, Nigeria. Specifically, the study intends to;

1. Determine the effect between the students' academic achievements in experimental and control groups in auto electrical system in the pre-test.
2. Determine the effect between the students' academic achievement in experimental group and that of control group in auto electrical system in the post-test.
3. Determine the effect between the students' academic achievement in experimental group in automobile auto electrical system in pre-test and post-test.

- Determine the effect between students' academic achievements in control group in auto electrical system in pre-test and post-test.
- Determine the effect between students' interest in experimental and control group in auto electrical system in pre-test and post-test.

Research Questions

The research question that guided the study will be formulated as follows:

- What is the effect between the students' academic achievements in experimental and control groups in auto electrical system in the pre-test?
- What is the effect between the students' academic achievement in experimental group and that of control group in auto electrical system in the post-test?
- What is the effect between the students' academic achievement in experimental group in auto electrical system in pre-test and post-test?
- What is the effect between students' academic achievements in control group in auto electrical system in pre-test and post-test?
- What is the effect between students' interest in experimental and control group in auto electrical system in pre-test and post-test?

Hypotheses

In the execution of the study, the following hypotheses will be tested at 0.5 level of significant.

HO1: There is no significant difference between the students' academic achievements in experimental and control groups in auto electrical system in the pre-test.

HO2: There is no significant difference between the students' academic achievement in experimental group and that of control group in auto electrical system in the post-test.

HO3: There is no significant difference between the students' academic achievement in experimental group in auto electrical system in pre-test and post-test.

HO4: There is no significant difference between students' interest in control group in auto electrical stem in pre-test and post-test.

HO5: There is no significant difference between students' interest in experimental control group in auto electrical system in pre-test and post-test.

Methodology

The researcher adopted a quasi-experimental design. Quasi experiment is an empirical study used to estimate the casual impact of an intervention on a target population (Cresswell, 2012). The study is designed to test the effect of scenario-based learning in Auto-electrical system as a strategy for teaching Auto-mobile Technology in colleges of education and polytechnic (NCE Tech.). In an experimental design, two major groups of subjects are required; experimental group and control group. The effects of the two approaches on student's achievements and interest will be determined by the subjects' achievements in a pre and post achievement test. And the scores on their interest inventory as can be seen in appendix C and D. Pretest and posttest design was

employed for this study as this design does not disrupt the original class setting organized by schools there by having the opportunity to use intact class. This is a type of experimental design that does not include random assignment of individuals to groups (Creswell, 2014).

The population of the study comprises of 70 Auto electrical students for National certificate in Education Technology (N.C.E Tech.) in Aminu Saleh college of education Azare and Abubakar Tatari Ali polytechnic Bauchi.

Considering the total population of the study which is 70 students, the researcher used the entire population, instead of subset of the population. The population is made up of the two intact classes of all year III students of NCE Technical Education in A.S. C.O.E Azare and ATAP Bauchi for experimental and control groups.

Finally, all research questions were answered using mean and standard deviation. While the research hypotheses were tested using paired sample t-test and analyzed using statistical package for social sciences (SPSS). Likewise, in order to determine the decision rule for all the hypotheses, any value that was found to be less than or equal to 0.05 the null hypotheses was rejected and the alternate hypotheses was accepted which indicate a significant difference. Similarly, any value that will found to be greater than 0.05, the null hypotheses was accepted which indicates that there is no significant difference. (Creswell, 2014).

Results

Research question 1: What is the effect between the students' academic achievements in experimental and control groups in auto electrical system in the pre-test?

Table 5: Pre-test scores of students of both Experimental and the Control Groups

Test type	N	Mean	Std. Deviation	Std. Error Mean
Pre-test				
Experimental	35	15.17	5.899	.270
Control	35	15.12	5.102	.265

Research question 2: What is the effect between the students' academic achievement in experimental group and that of control group in auto electrical system in the post-test?

Table 6: Post-test scores of students in both the Experimental and the Control Group

Test type	N	Mean	Std. Deviation	Std. Error Mean
Post-test				
Experimental	35	17.13	4.179	.222
Control	35	14.21	4.554	.249

Research question 3: What is the effect between the students' academic achievement in experimental group in auto electrical system in pre-test and post-test?

Table 7: Pre-test and Post-test scores of students in the Experimental Group.

Group	N	Mean	Std. Deviation	Std. Error Mean
Experimental				
Pretest	35	9.17	.183	1.390
Post Test	35	25.29	.169	2.248

Research question 4: What is the effect between students' academic achievements in control group in auto electrical system in pre-test and post-test?

Table 8: Pre-test and Post-test scores of students in the Control group

GROUP	N	Mean	Std.	Std. Error
Control			Deviation	Mean
Pretest	35	5.84	.090	1.101
Post Test	35	10.55	.095	1.277

Research question 5: What is the effect between students’ interest in experimental and control group in auto electrical system?

Table 9: mean scores of students interest of both Experimental and the Control Groups

Test type	N	Mean	Std.	Std. Error
Student interest inventory			Deviation	Mean
Experimental	35	18.26	5.657	.241
Control	35	8.15	5.006	.222

Findings of the Study

The major findings of this study are as follows

1. The students’ academic achievement in auto electrical system in the experimental and control group was almost similar during pre-test.
2. The students’ academic achievement in auto electrical system in the experimental group was higher than that of the control group in the post-test.
3. The students’ academic achievement in auto electrical system in the experimental group was higher during post-test than in the pre-test.
4. The students’ academic achievement in auto electrical system in the control group was higher during post-test than in the pre-test.
5. The students’ interest in auto electrical system in the experimental group is higher than those in the control group.

Discussions

The findings in relation to research question one was intended to determine the effect between the students’ academic achievements in experimental and control groups in auto electrical system in the pre-test. Table 5 shows the descriptive statistics for both experimental and control group. In the experimental group, the mean is 15.17 while the control group the mean is 15.12. From these findings, the groups mean score are almost equal (a difference of 0.06) implying that the two groups of students were similar in auto electrical system in the pre-test. However, there was no significance difference between students’ academic achievement in auto electrical system in the experimental and that of the control group in the pre-test level. This was confirmed by the research hypotheses tested in table 10. These findings correspond to a finding of Tyav (2016) who conducted a study on the effect of multimedia technique on technical college students’ academic achievement in auto-mechanics in Benue state and reported that there was no significant difference in achievement scores of both experimental and control groups in the pre-test.

The finding in relation to research question two was intended to determine the effect between the student’s academic achievements in experimental and control in auto electrical system in the post-test. In Table 6 results shows the descriptive statistics of the post test scores for both experimental and control groups. In experimental group, N=35 had a mean score of 17.13 and a standard deviation of

4.179. In the control group, N=35 had a mean score of 14.21, and a standard deviation of 4.554. From the findings the students’ academic achievement in auto electrical system in the experimental group was higher than that of the control group in the post-test. This was confirmed by the research hypothesis tested in table 11. This indicate that there was a significance difference between students’ academic achievement in experimental group and that of the control group in auto electrical system in the post-test. This is associated with the findings of Cyril (2016b) who conducted a study on the effect of multimedia instruction on students’ performance and reported that there was a significant difference in the post-test score of students between the experimental and the control groups. Based on this finding, it was established that students taught with using scenario based had better academic achievement than students taught with conventional method of teaching.

The finding in relation to research question three revealed that the students’ academic achievement in auto electrical system in the experimental group was higher during post-test than in the pre-test.

Table 7 shows the pre-test and post-test of students’ academic achievement in the experimental group; where the pre-test mean score of students was 9.17and standard deviation of 1.83 while the post-test mean score of the group was 25.29 and standard deviation of 1.69 this indicates that the experimental group had higher academic achievement during post-test than the pre-test. This was proved by the research hypothesis tested in table 12. Therefore, there was a significant difference between students’ academic achievement in the experimental group in auto electrical system during pre-test and post-test. This was as a result of the treatment administered after the pre-test. This was in line with the findings of Ikwuka (2017) who carried out a study on Effect of Computer Animation on Chemistry Academic Achievement of Secondary School Students in Anambra State, and reported that there was a significant difference between pre-test and post-test of students taught with computer animation in the experimental group.

The finding in relation to research question four showed that the students’ academic achievement in auto electrical system in the control group was higher during post-test than in the pre-test. This was evident by the research hypothesis tested in table 13. This revealed that there was a significant difference between the students’ academic achievement in the control group in auto electrical system during pre-test and post-test. This was resulted due to the instruction given to them before the post-test. These finding is in line with the findings of Peter *et al.* (2010) which revealed that there was a significant difference between pre-test and post-test mean score of students in the control group.

The finding in relation to research question five was intended to determine the effect between the student’s interests in experimental and control group in auto electrical system in the post-test. From the findings the students’ interests in auto electrical system in the experimental group was higher than that of the control group in the post-test.

Conclusion

After the findings gathered on this study, it was concluded that the students, academic achievement and interest in auto electrical system in the experimental group was higher than that of the control group. This revealed that there was a significant difference in academic achievement between the

students taught with scenario-based learning and those taught with conventional method of teaching, therefore, scenario-based learning is more credible to use in teaching automotive courses.

Recommendations

Based on the findings of this study, the following recommendation was made:

1. The use of scenario-based learning should be adopted in teaching auto electrical system and other automotive courses in north-east Nigeria so as to improve academic achievement and interest of students.
2. In addition to the use of conventional teaching method, automobile teachers should be encouraged to be using scenario-based learning in order to suppress the inappropriateness of conventional method of teaching.
3. Researchers in TVET and other field of studies whose curriculum is practical base should replicate this study to promote understanding of instructional objectives and improve students' academic achievements and interest.

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