



## Effect of e-Model Scenario-Based Teaching Strategy on Students' Performance in Electronics Works Trade in Technical Colleges in Gombe State

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### ABSTRACT

*This research was carried out with the aim of testing the E-Model Scenario-Based Teaching Strategy on Technical College Students' Performance in Electronics Works Trade in Gombe state. Three (3) research questions and one hypothesis were formulated to guide the study. The study adopted Pre-test–post-test non-equivalent group Quasi-experimental design. The area of the study was Gombe state. The population of the study consisted of 145 students while the sample of the study consisted of 58 students from the two selected technical colleges. The instrument used for the collection of data was Electronics Works Performance Test Instrument (EWPTI), which is a 10-item instrument for assessing how students conducted the practical test. The test instrument was validated by two experts from the Department of Electrical Technology Education MAU, Yola and one expert from the Department of Vocational and Technology Education, Abubakar Tafawa Balewa University, Bauchi. A reliability coefficient of 0.8 was obtained using Chronbach's Alpha method which showed that the instrument was valid. Mean and standard deviation was used to analyze research questions while a t-test was used to test the hypotheses at a 0.05 level of significance. The students were taught for a period of six weeks. The experimental group was taught using E-Model SBT while the control group was taught using the conventional method. Post-test was administered to the students after the treatment. The pre-test means performance scores of students in experimental and control groups were 45.72 and 45.33 respectively while the post-test mean performance scores of students in the experimental and control groups were 75.93 and 62.87 respectively. The findings revealed among others that, students taught using E-Model SBT performed better than the students taught using the conventional method. It was therefore recommended that teachers should be trained and encouraged to use both offline and online e-Model SBT in the process of teaching.*

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### INTRODUCTION

Radio/Television and Electronic Works (RTVe) is a trade which consists of subjects that cover both cognitive and psychomotor aspects of learning. The trade is designed to equip students with hands-on experience in installing, maintaining and servicing of electronic devices and systems (National Business and Technical

Examinations Board, 2006). The trade also enables the trainees acquire the operations of common electronics devices as well as understand the basic concepts of satellite transmission, reception and installation. It also enables the trainees appreciate the operations of electronics devices as well as acquiring practical



skills in diagnosing faults and repair television (NABTEB, 2006). RTV trade prepares students to become machine operators, artisans, craftsmen and master craftsmen in Radio, Television, and Electronics works (Zambwa, Makinde & Samaila, 2018). Radio Communication trade is clustered into modules of instruction as follows. Electronics devices and Circuits, Radio and Audio frequency amplifiers, Radio system, Television I, Television II, Colored Television and Radio and Electronics system (NBTE, 2006). The modules are designed to give training and impart necessary skills leading to the production of craftsmen and other skilled personnel who will be enterprising and self-reliant (FRN, 2004). Specifically the Radio, Television and Electronic works modules are designed among other things to provide the student with basic competencies that will enable trainees dismantle, assemble, repair, service, maintain and install Radio and Television sets, Amplifiers, Video recorders and other Electronic appliances, system and circuits (NBTE, 2006). The Federal and State governments of Nigeria have recognized the importance of teaching radio; television and electronics works trade in technical colleges. Hence, the programmes are being introduced in many Federal and State Technical Colleges (NABTEB, 2006).

According to Kumar (2006), Electronics students find it difficult to understand the principles, operations, practices and application of most of the Electronic Devices. These limitations encountered by students of Technical Colleges could be among the possible reasons for the difficulties they encounter in learning electrical electronics related disciplines at the tertiary education level. In order to lay a sound foundation for electronics work trade students, teachers need to diversify their instructional approaches so as to help such students to effectively specialize in any of the chosen electronics career related courses; Tumba and Chinda (2014) observed that Electronics works trade students of Technical colleges find it difficult to understand the principles and practices of Electronics which leads to their poor performance in theoretical and practical courses. Their study revealed that the use of conventional method of teaching could be the major factor that

affects their performance in learning electronic skills.

Conventional teaching method has been defined by Sawant and Rizvi (2015) as the teacher-centered approach where teacher is active and students are passive in teaching and learning process. It has also been defined by Kivunja (2013) as the method of teaching using chalk and board for teachers; pen and paper for students. Unfortunately, conventional teaching methods such as lecture method and demonstration method are more widespread in Nigeria (Gombe state inclusive) than modern methods of teaching and there is a need to investigate empirically on student-centered methods of teaching that will help students to improve on their performance in electronics (Errigton, 2010). Recent studies conducted by Ogbu (2018), Chinda (2016) and Petal (2014), have also shown that, conventional method of teaching focuses on inculcating knowledge to learners with little application or practice thus, making the conventional method of teaching ineffective. On the other hand, modern methods of teaching expose learners to active participation in classroom lessons and its assessment is seen as activity integrated with teaching and learning which occur through observation. Modern methods of teaching involve use of modern ways to improve teaching and learning in classroom. For example, Teleconference method of teaching which involves use of computer with Wi-fi connection in the classroom where teacher demonstrates the subject on his computer and students receive lectures in their various homes. Another modern method of teaching is Scenario-Based teaching, which is the modern method for this study.

Scenario Based Teaching (SBT) is a teaching method or strategy that encourages students to fully participate in classroom lessons using real-life stories, and sometimes incorporated with photos and video clips of local community activities that students are conversant with for the purpose of explaining professional concepts so that students could get real knowledge of the subject matter (Patel, 2014). The learning involves students' interaction with model of teaching which explains electronic work concepts inform of stories, pictures and



videos through the use of an online application package known as e-Model Scenario-based teaching. e-Model Scenario-based Teaching (SBT) is a software that follows the model of Scenario-Based teaching strategy so that learners are actively involved in an online programmed instruction and work at their own pace, it can be on individual basis or in small groups as the instruction provides immediate feedback. Students do not move to the higher level until he masters the concept. On the other hand, the teacher becomes mediator or collaborator instead of being the key source of information and transmitter of knowledge and skills. This is in line with the study conducted by Samai'ila, Makinde and Zambuwa (2016) where they stated that, a teacher is a mediator that helps his students to have concrete knowledge and skills in teaching electrical course with Computer Assisted Instruction (CAI). Hence, it can be observed that, there is a compelling challenge to also expose electronic students in technical colleges because the world community of knowledge now depends on digital systems. This calls for Co-opting e-learning into the classroom by electronic teachers in order to meet the world standard.

Epunam (2009) defined performance as the learning outcomes which include knowledge and skills that are acquired through course of study within and outside the classroom situation that can help to have a better performance in examination. Academic performance refers to knowledge and skills obtained by students in a school or institution's subject or course designated by a score obtained in a performance test. It also describes student's success by which each student achieves during the implementation of the curricular strategies. According to Ajuar (2006), academic performance entails successful academic progress attained through effort and skill. It involves determination of the degree of attainment of the learner's course or program to which the learners were sufficiently exposed. Students' performance connotes performance in school subject as symbolized by a score or mark on a performance test. Performance is the measurement of the effects of specific programme of instruction or training (Kulbir,

2005). It can also be defined as something that somebody has succeeded in doing, especially after a lot of effort. Performance is one of the key outcomes of learning especially when students are highly interested in the subject, method of teaching and the teacher himself. Literature from the above studies has shown that, the use of conventional method of teaching could be the major factor that affects their performance in learning electronic skills, however, the use of e-model Scenario-based teaching may help students of Electronics to improve their performance.

### Statement of the Problem

In spite of the efforts by successive Nigerian governments aimed at improving the quality of education in technical colleges, the academic performance of the students in Electronics works trade is not encouraging. Several factors have been lamented in the literature that could have caused such poor performance of students, these include: school management factor, student's factor and teacher factor. The study will put emphasis on teacher factor as Lucas, Baba, Godwin and Fai (2022) identified lack of good methodology as the major reason for low performance and drop-outs in the technical colleges in Nigeria. Ogbu (2018) observed that students' poor performance in Electronics works trade at national examinations has persisted over the last ten years, and consequently has resulted in unemployment, poverty among craftsmen plus scarcity of skilled men and women needed for the growth of the nation's economy. Abdullatif and Rufa'i (2014) stated that the quality of technical college graduates has been a major concern for most employers of labor in Nigeria. Chief Examiner's Report (2014-2018) reveals that out of 9,225 students that sat for electronic works examination only 38.6% passed at credit level. This statistics showed that, about 60 percent of technical college students lack knowledge and skill required in electronic works trade. Studies have shown that, this poor performance is attributed to poor delivery of instruction in the classroom. Few to mention are studies conducted by Lancaster and Lau (2020) where they stated that, adoption of teacher-centered methods of teaching by the



teachers results into ineffective use of varieties of instructional methods and instructional techniques and inability of teachers to effectively implement the curriculum to naturally increase students' interest, participation and commitment in learning. Ogbuanya and Owodunni (2015) stated that, the shortcomings of teacher-centered method of teaching could be responsible for poor academic performance of Electronics works trade students in public examination. The methods used for teaching students in technical colleges especially in Electronics works trade are not sufficient enough to inculcate the desired knowledge and skills to students in such a way

### Research Questions

The following research questions were posed to guide the study:

- 1) What are the differences in the pre-test and post-test mean performance scores of students who were taught Electronic concepts using e-Model SBT?
- 2) What are the differences in the pre-test and post-test mean performance scores of students who were taught Electronic concepts using lecture method?
- 3) What are the differences in the post-test mean performance scores of students who were taught Electronic Concepts using e-Model SBT and those taught using lecture method?

### Hypothesis

One hypothesis was raised and tested in this study as follows;

**H<sub>01</sub>:** There is no significant difference between the mean performance scores of students who were taught Electronic concepts using E-Model SBT and those taught using lecture method.

### METHODOLOGY

The study adopted Pre-test – post-test non-equivalent group Quasi-experimental design: - This is a research design in which experimental techniques are applied to an intact class without random allocation of students into groups (Nworgu, 2003). This research design was suitable for this study because the researcher avoided disruption of the normal class set up

that the teaching and learning process becomes lively and interesting to both students and their teachers (Maigida, Saba & Namkere, 2013). In order to address and improve on the issue of teaching and learning techniques and methodologies in Electronics works trade, there is a need to use a valid and reliable model of teaching method inform of software application so that electronic teachers will find it easy to teach the abstract and difficult concepts of the trade in an explicit way for students to acquire knowledge and skills that will equip them for the world of work and perform better in public examinations.

organized by the school authorities. Pre-test was conducted for both experimental and control groups in order to determine entry behavior and equivalence of the two groups before giving any treatment to the groups. After that, control group were taught electronics-work concepts using conventional method while experimental group were taught the same electronics-work concepts using e-model Scenario-Based Teaching.

<b>G<sub>E</sub></b>	<b>O<sub>1</sub></b>	<b>X<sub>1</sub></b>	<b>O<sub>2</sub></b>
<b>G<sub>C</sub></b>	<b>O<sub>1</sub></b>		<b>O<sub>2</sub></b>

Where: G<sub>E</sub> refers to the experimental group and G<sub>C</sub> refers to the control group

O<sub>1</sub> and O<sub>2</sub> indicate pretest and posttest respectively

X<sub>1</sub> is the treatment that was given to the experimental group

The population of the study consisted of 145 students of Electronics works trade from four (4) technical colleges while the sample of the study was 58 students from two intact classes of the two technical colleges; 15 students from GSTC Gombe and 43 students from GSTC Barunde. Simple random sampling technique was used to assign one technical college as experimental group while the other technical college was assigned as a control group. The experimental group was taught using E-model SBT while control group was taught using lecture method. The instrument used for the collection of data was Electronics Works Performance Test Instrument (EWPTI). Electronics Works Performance Test Instrument (EWPTI) is a 10-item instrument for assessing how students



conducted the practical. It uses the standard Graphical rating-scale which commonly uses tabular scale for evaluating formative and summative performance/practical test. It has series of cells for a rater or examiner to tick the appropriate quality or performance of practical work of a person being rated (Enemali, 2010). It was used for the assessment of each step of a particular task using: "Highly Skilled" which carried 5 marks, "Skilled" which carried 4 marks, "Moderately Skilled" which carried 3 marks, "Limitedly Skilled" which carried 2 marks and "Not Skilled" carried 1 mark. This gave a total of 50 marks (50 x 2 = 100marks) for a student that

scored 5 marks in all the 10 items in the Electronic Work Performance Rating Scale. The test instrument was validated by two experts from the Department of Electrical Technology Education MAU, Yola and one expert from Department of Vocational and Technology Education, AbubakarTafawa Balewa University, Bauchi. A reliability coefficient of 0.8 was obtained which showed that the instrument was valid. Mean and standard deviation were used to analyze research questions while t-test was used to test the hypotheses at 0.05-level of significance.

**Table 1:** Pre-test and post-test mean performance scores of students in experimental group

Group	Performance Test	N	Mean (x)	Mean Difference	Remark
Experimental	Pre-test	43	45.72	30.21	VHD
	Post-test	43	75.93		

**Source:** Field Survey, 2021

The results in Table 1 revealed the pre-test and post-test mean performance scores of the experimental group, where the mean performance score of students at pretest level was 45.72, while their mean performance score at post-test level was 75.93. The mean difference was 30.21, which showed that there was a Very

High Difference (VHD) between the pre-test and post-test mean performance scores of students who were taught Electronic concepts using E-Model SBT. In other word, the post-test mean performance score of students was higher than their pre-test mean performance scores.

**Table 2:** Pre-test and post-test mean performance scores of students in control group

Group	Performance Test	N	Mean (x)	Mean Difference	Remark
Control	Pre-test	15	45.33	17.54	VHD
	Post-test	15	62.87		

**Source:** Field Survey, 2021

The results in Table 2 revealed the pre-test and post-test mean performance scores of the control group, where the mean performance score of students at pretest level was 45.33, while their mean performance score at post-test level was 62.87. The mean difference was 17.54, which showed that there was a Very High

Difference (VHD) between the pre-test and post-test mean performance scores of students who were taught Electronic concepts using Lecture method. In other word, the post-test mean performance score of students was higher than their pre-test mean performance scores.

**Table 3:** Post-test mean performance scores of students in experimental and control groups

Group	Performance Test	N	Mean (x)	Mean Difference	Remark
Experimental	Post-test	43	75.93	13.06	VHD
Control	Post-test	15	62.87		

**Source:** Field Survey, 2021

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The results from Table 3 revealed the post-test performance scores of experimental and control groups; where post-test mean performance scores of students in experimental group was 75.93, while the post-test mean performance scores of students in control group was 62.87. The mean difference was 13.06, which showed that the mean difference was

30.21, which showed that there was a Very High Difference (VHD) in the post-test mean achievement scores of students who were taught Electronic concepts using e-Model SBT and those taught using conventional method. In other word, experimental group performed better than control group.

**Table 4:** t-test mean performance scores of students taught electronic concepts using e-model sbt and those taught using lecture method

Variable	Group	N	Mean	S.D	df	t	Sig.	Decision
Performance Test	Exp.	43	75.93	5.43	56	8.69	0.000	Reject H <sub>01</sub>
	Cont.	15	62.87	3.46				

**Source:** Field Survey, 2021

Table 4 shows the mean performance scores of students in experimental and control groups; where the probability value of 0.000 is less than the 0.05 significance level used for investigation  $p$  ( $0.000 < 0.005$ ). The null hypothesis which stated that there is no significant difference between the mean performance scores of students who were taught Electronic concepts using E-Model SBT and

those taught using lecture method is rejected. Inference drawn therefore is that, there was a significant difference between the mean performance scores of students who were taught Electronic concepts using E-Model SBT and those taught using lecture method. This implies that, students taught Electronic concepts using E-Model SBT performed better than those taught using lecture method in a performance test.

### FINDINGS OF THE STUDY

The results of the study revealed the following findings:

1. Post-test mean performance scores of students taught using E-Model SBT was higher than their pre-test mean performance scores (Mean = 75.93 and 45.72 respectively). This implies that, the performance of students taught using e-Model SBT in post-test was higher than their performance in pre-test.
2. Post-test mean performance scores of students taught using lecture was higher than their pre-test mean performance scores (Mean = 62.87 and 45.33 respectively). This implies that, the performance of students taught using lecture in post-test was higher than their performance in pre-test.
3. Post-test mean performance scores of students who were taught Electronic Concepts using E-Model SBT was higher than those taught using lecture method of

teaching (Mean = 75.93 and 62.87 respectively). This implies that, students taught using E-Model SBT performed better than those taught using lecture method in post-test.

4. There was a significant difference between the mean performance scores of students who were taught Electronic concepts using E-Model SBT and those taught using conventional method of teaching before and after the treatment. This implies that, post-test mean performance scores of students was higher than their pre-test mean performance scores in both experimental and control groups.

### DISCUSSION OF FINDINGS

The findings of the study also revealed that, post-test mean performance scores of students taught using E-Model SBT was higher than their pre-test mean performance scores. Students taught in using e-Model SBT had higher mean performance scores (Mean = 75.93) in



post-test with pre-test mean performance score (Mean =45.72). This agrees with the findings of Gull and Shehzad (2015) who conducted research on two teaching methods where students in experimental group had a higher mean performance scores at post-test level. The findings from post-test revealed that, Post-test mean performance scores of students who were taught Electronic Concepts using E-Model SBT was higher than those taught using conventional method of teaching. Students in experimental group had a higher mean performance score (Mean = 75.93) while those electronic students in control group had lower mean performance score (Mean = 62.87).

The results of this study on mean performance score revealed that, there was a significant difference between the mean performance scores of students who were taught Electronic concepts using E-Model SBT and those taught using conventional method of teaching. This implies that, the mean performance scores of students in experimental group was higher than the mean performance scores of students in control group. Since the calculated Probability value (0.000) was less than the 0.05 alpha level of significance and the calculated t value ( $t_{cal}=8.69$ ) was greater than the critical value ( $t_{crit}=2.000$ ), the null hypothesis was rejected.

## CONCLUSION

The findings of the study serve as the basis for drawing the following conclusions. The

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performance of Electronics works students in experimental group was attributed to the use of E-Model SBT, which helped students to understand Electronic concepts using the community activities they are familiar with. Based on the findings of the study, it can be concluded that, E-Model SBT helped to improve students' performance in Electronic works trade.

## RECOMMENDATIONS

The following recommendations were proffered based on the findings of the study;

1. Ministry of education should recommend the use of e-Model SBT in Nigerian Technical colleges.
2. Management of Technical colleges should encourage Electronic Works teachers to implement e-Model SBT in teaching both theory and practical in order to improve the performance of students.
3. Electronic works teachers in technical colleges should be discouraged from exclusive use of conventional method of teaching.
4. Electronic works teachers in technical colleges should learn how to develop lesson using e-Model SBT in order to improve both students' performance and achievement.
5. Electronic teachers in technical colleges should explore the use of e-Model SBT other topics in Electronic works trade in order to improve students' performance, achievement and retention.



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