# EFFECTS OF INDIVIDUALISED COMPUTER-ASSISTED INSTRUCTIONAL PACKAGE ON ACADEMIC ACHIEVEMENT OF TECHNICAL COLLEGE STUDENTS IN BASIC ELECTRICITY IN NIGER STATE, NIGERIA

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***Abstract***

*This study determined the effects of computer-assisted instructional package on academic achievement of students in Technical Colleges in Niger State. The study adopted a pre-test, post-test, non-equivalent control group quasi-experimental research design. The population of the study was 80 Technical College (TC II) students of Basic Electricity. Two research questions and three null hypotheses were answered and tested respectively at 0.05 level of significance. The instrument used was Basic Electricity Achievement Test, (BEAT) The Computer Assisted Instructional package(CAIP) was subjected to validation by three experts. The BEAT was trial tested to determine the reliability coefficient. The BEAT reliability was found to be 0.76 using Pearson Product Moment Correlation Coefficient. Mean was used to answer research questions while ANCOVA was employed to test the hypotheses. Results from the study revealed that computer-assisted instructional package is more effective in improving students' achievement in Basic Electricity than Conventional method. There was an effect of gender on students' achievement in Basic Electricity favouring males. The study also found out that there was no interaction effect of CAIP and gender on achievement of Technical College students in Basic Electricity. It was recommended that technical college teachers should be encouraged to be computer literate ,this will enable them to appreciate the use of CAIP .Technical Colleges should also adopt the CAI package for teaching students' basic electricity to promote effective teaching and learning*

***Keywords***: *Computer-Assisted Instruction, Technical college, Effect, Teaching, Basic Electricity Achievement Test.*

**Introduction**

Vocational educators face the challenge of utilizing and integrating computers and related technologies into their instruction in a manner that enhances students' learning and achievement (Kulk & Kulik). .Mbah (2002) remarked that achievement is dependent upon several factors among which are instructional techniques, the learning environment, and motivation for stimulating students' interest in learning. Therefore, academic achievement of students in Basic Electricity also depends on whether the subject interests them or not. A student's interest in academic achievement will induce him to behave and act in a certain way towards his studies. Therefore, the use of CAI technique is

important to provide rich environment that will stimulate the interest of technical college students in technological subjects such as basic electricity.

In addition, Federal Ministry of Education has observed that some of the factors responsible for high failure rate of technical college students in the NABTEB Examinations include poor teaching in technical colleges, poor quality of teaching staff, lack of well-equipped workshop and inadequate teaching methods (FME, 2010) .. Lecture method, which is teacher-centred method is the main teaching method employed by technical teachers for delivering the curriculum which does not involve the use of varieties of instructional method. The shot coming of this teacher-centred method of teaching could be responsible for poor achievement of the students in public examination. Therefore, there is a need for change of methods and techniques in the teaching of basic electricity so as to enable the students of technical colleges acquire adequate knowledge and skills for better achievement in public examination.

Hence, the use of computer in the classroom has given rise to CAI software packages for effectiveness of classroom instructional purposes. According to Umaru (2003), CAI is a program of instruction or package presented as computer software for instructional purpose.The computer appears to have potentials for enhancing teachings and learning (Yusuf & Afolabi, 2010). CAI is becoming more important to vocational education, since at least 10 million schools in developed world now have computers, and by the year 2020, 75% of jobs may require computer knowledge (Imel,2010).

The technological development of any nation lies on the study of science and technology (Essien, 2007). In spite of the importance of basic electricity in technology education as a component of several specialized vocational subjects at the universities, addressing students' achievement at the technical colleges level should not be under estimated. Many researchers have attempted finding out the causes of students' poor achievement in vocational subjects. (Mathew, 2002). Problems identified include poor instructional strategies, abstract nature of science and technological concept, poor infrastructure and inadequate workshop/laboratory facilities (Mathew, 2002; Shchu, 2006; Okebukola,2000). These findings led a number of technology educators to conclude that technical education subject is not effectively taught in our schools (Okebukola, 2000).

However, some teaching strategies have been identified by researchers to be effective in promoting technology learning outcome. Such strategies as computer- assisted instruction (Yusuf &

Afolabi, 2010; Tekas & Solomonidou, 2009); mobile learning (Adetona & Rafiu, 2006), electronics learning (Gambari & Gana, 2005) and many others are rare in Nigerian vocational and technical education classrooms. Aina (2000) stated that the achievement of students in any subject is based on the quality of instructional aid employed by the teachers. Textbook alone can no longer be relied upon as the chief instructional medium for teaching subject like basic electricity if the subject matter must be effectively taught to the learner (Adetona & Rafiu, 2006). Thus, the use of viable communication technologies such as CAI has to be introduced by the teacher to make teaching and learning of basic electricity effective.

According to the National policy on Education basic electricity is one of Electrical/Electronic trades offered in Nigerian technical colleges (FRN, 2013) .The National Policy on Education stressed further that graduates of technical college are expected to have background knowledge on repairing faults on electrical gadgets to manufacturers' specifications. These graduates may proceed to tertiary institutions for further studies in technical education.

Liao (2002) revealed that CAI package bridged the gap between male and female students' academic achievement in physics. Hence, an attempt will be made to find out if computer-assisted instructional package will bridge the gap between male and female students' academic achievement in basic electricity. This study is therefore designed to determine the effect of individualised computer assisted instructional package on students' academic achievement of technical college students in basic electricity in Niger State.

**Statement of the Problem**

It is quite unfortunate to observe that electrical technology graduates from technical colleges are finding it difficult to achieve the instructional goals (Robinson, 2017). This is noted in the failure of many of them to acquire practical skills in the field of electricity. This is supported with the problem in the utilization of conventional method of teaching methods in basic electricity. Olumorin (2011) asserted that teaching process has been predominantly teacher-centered and teacher-directed and that these conventional teaching methods do not lay much emphasis on project-base, active learning and students self-assessment. The shorts coming of these teachers centred methods of teaching could be responsible for poor achievement of the students in public examination. Therefore,

there is a need for change of methods and techniques in the teaching of basic electricity so as to enable the students of technical colleges acquire adequate knowledge and skills for better achievement in public examination.

**Research questions:**

The study sought answers to the following research questions;

1 What is the difference between the mean achievement scores of technical college students taught using CAI package and those taught without it?

2 Does gender influence students' achievement when they are taught Basic Electricity using CAI package?

**Hypotheses**

The following null hypotheses were formulated and tested at .05 level of significance.

**$Ho_1$:** There is no significant difference between the mean achievement scores of basic electricity students taught with CAI and those taught without the CAI software.

**$Ho_2$:** There is no significant difference between the mean achievement scores of male and female basic electricity students taught with the CAI Package.

**Methodology**

The research design adopted for this study was pretest –posttest quasi-experimental design. This design was adopted because the two groups involved have a common variable (achievement and gender).

**Area of the Study**

This study was carried out in Niger State. The state has Six NBTE accredited technical colleges offering basic electricity whose students were used as subjects for this study. Besides, these technical colleges have necessary facilities such as workshops and equipment required to conduct this study.

**Population of the Study**

The population for the study consisted of all the Technical Colleges in Niger State while the target population was two Technical Colleges in the state. Namely: Government Technical College, Minna and Government Technical College, Eyagi, Bida, which were purposively selected based on well-equipped workshop and facilities in the two sampled schools.

**Sample and Sampling Techniques**

The sample comprised of 40 students each from the two-sampled Technical Colleges II. The two sampled schools were randomly assigned to experimental and control groups.

Instrument Design and Validation

Two instruments used to gather relevant data for this study were CAI Package and BEAT These instruments were designed by the researchers to determine the effectiveness of the developed computer instructional package.

CAI Package was subjected to the experts' validation to verify the technicality of its development while the BEAT was subjected to content validation by electrical/electronic technology lecturers in the Department of Industrial and Technology Education, Federal University of Technology, Minna and experts from state Ministry of Education Niger State. These experts were requested to check the plausibility of the distraction, choice of appropriate alternatives for the multiple-choice questions. Clarity of the questions asked and language level of the items. After the face and Content Validity of the instruments had been established, the pilot try out of (BEAT) was conducted using TC II students of Government Technical College Ilorin, thus, selected school was outside the area of the study. The reliability coefficient of BEAT was found to be 0.79 using mean to answer the research questions while ANCOVAL was used to test the null hypotheses The method of data collection was based on the administering the test instrument BEAT on the experimental and control groups before and after teaching. The pretest was administered to the experimental and control groups. The scores obtained was used to determine the academic equivalence of the control groups before the experimental started. The teaching was done for the period of six weeks with control group being taught with the use of chalk-and-talk method of teaching. Experimental group was exposed to the use of CAI package. The scores of the experimental and control groups on the pretest and posttest was computed and used for data analysis. The data collected was analysed using Mean to answer the research questions while ANCOVAL was used to test the four null hypotheses formulated to guide this study. The level of the significance adopted for the analysis is P 0.05.

**Results and Discussion**

***Research Question 1***

What is the difference between the mean achievement scores of the Technical College Students taught using CAI Package and those taught without using CAI package.

**Table 1**

***Mean of Pretest and Posttest Scores of Experimental and Control and Groups in Basic Electricity Achievement Test***

| Group | N | Pretest | Posttest | Mean Gain |
|---|---|---|---|---|
| | | $\overline{X}$ | $\overline{X}$ | |
| **Experimental** | 40 | 3.12 | 22.32 | 19.20 |
| **Control** | 40 | 3.25 | 9.62 | 6.37 |

The data presented in Table 1 show that the experimental group had a mean score of 3.12 in the pretest and a mean score of 22.32 in the posttest making a pretest, posttest mean gain in experimental group to be19.20. The control group had a mean score of 3.25 in the pretest and a posttest mean of 9.62 with a pretest, posttest mean gain of 6.37. With this result, the students in the experimental group performed better in the achievement test than the students in the control group. Hence, computer assisted instructional package was found to be more effective than the conventional teaching method on students' achievement in Basic Electricity

***Research Question 2***

Does gender influence student achievement when they are taught basic electricity using computer-assisted instructional package and conventional method?

**Table 2**

***Mean of Pretest and Posttest of Male and Female Students Taught using Computer Assisted Instruction***

| Gender | Computer assisted instructional package | | | | Conventional Method | | | |
|---|---|---|---|---|---|---|---|---|
| | N | Pretest | Posttest | *Mean Gain* $\overline{X}$ | N | Pretest | Posttest | *Mean Gain* $\overline{X}$ |
| **Male** | 27 | 3.00 | 22.19 | 19.19 | 28 | 9.19 | 9.39 | 0.20 |
| **Female** | 13 | 3.38 | 22.62 | 19.24 | 12 | 10.17 | 10.54 | 0.37 |

The data presented in Table 2 show that male students taught Basic Electricity with computer assisted instructional package had a mean score of 3.00 in the pretest and a mean score of 22.19 in the posttest making a pretest, posttest mean gain in the male students taught with computer assisted instructional package to be19.19. Meanwhile, female students taught Basic Electricity with computer assisted instructional package had a mean score of 3.38 in the pretest and a posttest mean of 22.62 with a pretest, posttest mean gain of 19.24. Also, male students taught with conventional method had a mean score of 9.19 in the pretest and a mean score of 9.39 in the posttest making a pretest, posttest mean gain in the male students taught with conventional method to be 0.20. Meanwhile, female students taught Basic Electricity with conventional method had a mean score of 10.17 in the pretest and a posttest mean of 10.54 with a pretest, posttest mean gain of 0.37. With these results female students taught basic electricity had higher mean scores than male students in the Achievement Test. Thus, there is an effect attributable to gender on the achievement of students taught basic electricity.

**Discussion of findings**

The data presented in Table 1 provided answer to research question one, which sought to establish that what is the difference between mean achievement scores of Technical Colleges scores taught using computer assisted instructional package and those taught using conventional method. Also, null hypothesis, which states that there is no significant difference between the mean achievement scores of basic electricity students taught with computer assisted instruction and those taught with conventional method. Therefore, this study found out that computer-assisted instructional package is more effective than conventional method in enhancing students' achievement in basic electricity. This supports the findings of Robinson (2017) who carried a study on effectiveness of computer aided instructions (CAI) on students' performance in basic electricity in technical colleges in Rivers State of Nigeria. The research found out that students taught basic electricity using computer aided instructions in technical colleges in River State performed better than those taught basic electricity using the expository method.

Also, it corroborates the findings of Tabassum (2004) whose study found out that the adoption of computer-assisted instructional approach in the teaching of Islamabad biology students improved the students' achievement in biology than the students taught with traditional instructional

method. In addition, Okafor (2014), the use of traditional teaching method like 'Lecture Method' is a crucial facilitating factor to the poor performance of students in basic electricity in technical colleges. This traditional method is not advanced enough to generate satisfactory practical acquisition that conform to the modern dispensation of managing current flow in basic electricity. Also, Egbekwu (2004) remarked that Computer Assisted Instruction has a vital role on the students' academic performance and effective teaching-learning process. It is noted that innovative instructional strategy embraces the use of computer instructional strategy for teaching-learning effectiveness of several subjects including basic electricity.

The data presented in Table 2 provided answer to research question 2. Finding revealed that female students had a higher mean score in the basic electricity achievement test than male students. The obvious implication of this finding is that there was an effect attributable to gender on achievement of students in basic electricity. This finding is similar to findings of several other studies that had been conducted on gender effects on achievement of male and female students in scientific achievement. For instances, one of the important discoveries emerging from studies involving the effect of computer-assisted instructional approach on academic achievement was the revelation of gender differences favouring girls.

**Conclusion**

Based on the finding of this study, it has been observed that developed CAI package used in the study for teaching improves students' academic achievement in Basic Electricity at Technical College. The developed CAI package used in the study has significant influence on students' academic achievement in Basic Electricity at Technical College, government also has significant influence on the academic achievement of students taught Basic Electricity with CAI package at Technical College level. This could be in term of facility provision and quality of staff employed.

**Recommendations**

Based on the major findings of this study, the following recommendations are proffered.:

1. Computer-assisted instructional package is gender friendly because it enhanced the achievement of male female students alike therefore, basic electricity teachers should n employ these strategies to improve female students' achievement and interest in Basic Electricity subject.

2. National Board for Technical Education (NBTE) should consider review of curriculum for Basic Electricity with a view to incorporating computer-assisted instructional package into the teaching of Basic Electricity.

3. Technical college teachers should be encouraged to be computer literate. This will enable them to appreciate and use of computer-assisted learning strategies to promote effective teaching and learning.

4. Text book writers should shift emphasis from teacher- centered to learner centered activities that will promote learning by doing social interaction, group activity based learning such as Computer-Assisted strategies in the teacher's manual/teacher's guide

5. Computer programmer and developers should develop relevant computer assisted instructional packages for use within the Nigerian technical colleges

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