



# Impact Of Multimedia And Hypermedia Instruction On Students' Academic Achievement On Basic Electricity Technology In Oyo State Government Technical Colleges

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## Abstract

This research was carried out to ascertain the impact of Multimedia and Hypermedia on students' academic achievement on basic electricity technology subjects in Oyo State Government Technical Colleges, Nigeria. Quasi experimental design involving pretest, posttest and non-randomized comparison group was used for the study. Two research questions and two hypotheses were raised to guide the study. A total of one hundred (100) final year students of basic electricity in electrical and electronic Department from the five Oyo State Government Technical Colleges constitute the Population of the study. Basic Electricity Achievement Test (BEAT) with 40 test items involving application of multimedia and hypermedia resources was used for the instrument for data collection. The instrument was subjected to face and content validity by ICT experts in Emmanuel Alayande University of Education ICT Centre. The reliability of the instrument was determined using Pearson Product Moment Correlation to obtain 0.85, while the Kuder- Richardson (K-R20) formula was used to determine the internal consistency and the result obtained was 0.78 as pilot study conducted in two of Osun State Technical Colleges Mean and Standard Deviation were used to answer the research questions while the Analysis of Covariance (ANCOVA) was employed to test the hypotheses that

guided the study. The findings from the study revealed that multimedia and hypermedia instructions were effective in enhancing students' academic achievement of the students in basic electricity. The study findings was found out to be effective and reliable as there was a significant difference between the main effects of gender (male and female) on students 'academic achievement of the students in basic electricity. The study recommended for the adoption of multimedia and hypermedia instructional resources, also advocating for training and retraining of teachers and students on effective utilization of multimedia and hypermedia instructional resources.

**Keywords:** Multimedia Instruction, Hypermedia Instruction, Basic Electricity, Technical Colleges, Academic Achievement

## Introduction

Globally, the advent of information and communication technology (ICT) has been acknowledged as one of the most remarkable and transformative technology experienced in different spheres of human development, education inclusive. In the same vein, advancement in the present twenty first century has introduced diverse ICT tools which are responsible for the monumental and radical transformation in the teaching and learning environment. This transformation is responsible for the paradigm shift from the conventional talk and chalk method of learning to a more advanced method of instruction which involves the uses of a wide range of ICT tools. One of the most popular form of ICT tools presently used in the school system involves the use of instructional multimedia. Instructional multimedia is the combination of two or more forms of media to enhance teaching and learning effectively in the classroom (Adewoyin,.2011) Multimedia instruction has been defined as the use of radio, tape recorder, slide teaching machine, forms trips, firms, chart, maps, graphic, video, tapes recorders, slide protector, opaque, projector, still pictures, programmed instruction, overhead, television, computer and many more (Aduwa & Imogie, 2007). These instructional multimedia resources assist in great measures in disseminating information and communication towards teaching and learning process both at home and in the schools especially in a class with large number of students. Instructional multimedia are vehicles through which instructions are disseminated to the learners for the purpose of appealing to their senses of touching, seeing, hearing, and feeling so that the desired behavioural changes are achieved (Tunde, 2013).

Consequently, instructional multimedia can be inferred as information carrier employed in the classroom to teach the students and to display information relating to teaching and learning. The above multimedia has been described as powerful possibilities for improving the learning process which make a difference in learners'.(Brickman & Redmond, 2006). Further advancement in ICT lead to the development of education and the use of multimedia and hypermedia tools in teaching and learning serves as instructional resources includes online internet browsing, interactive online transmission, email, e-payment, Facebook,Whatsapp,Twitter, Instagram, Website, classroom goggle You-Tube, Skype, and many more (Carlson & Firpo, 2009). These channels of passing and receiving information can be effectively adopted for teaching and learning in classroom situation. Thus, the use of both the multimedia and hypermedia as innovative instructional approach can improve the overall academic achievement of the students of basic electricity in Nigeria particularly Technical Colleges. Academic achievement of the students is the measure of performance of the training acquired by the students within a stipulated period of time which can be evaluated by formative or summative Therefore, academic achievement according to Akudolu (2013) is the expression used to present students' scholastic understanding and is a function of various factors such as methods of teaching, teachers' qualifications, and children home background, school environment and interest develop by the students. Moreover, academic achievement reflect the effectiveness of teaching, students learning style, and the total of students' effort put in studying and in utilizing

Basic electricity is one of the technology subjects offered at technical colleges in Nigeria, while it's curriculum content in technical college is designed to provide students with the knowledge of the concepts in basic electricity, to promote their understanding of the world around them. The curriculum is designed at developing broad applicable of technical skills such as problem solving, communication, critical thinking and objective reasoning abilities, to enable them prepare for work place and self-sustainability in the world economy (FRN, 2013). With these objectives of the curriculum in mind, students in respect of the gender (male and female) are expected to be useful and productive members

of the society. Unfortunately, technical colleges' students tend to fall short of the expectations due to improper ways of teaching the subject at technical college. This tends has been attributed to basic electricity teachers who solely rely on the traditional chalk and talk method of instructions at the expense of the use of flexible innovative methods of instructions such as the use of multimedia and hypermedia instructions (Umunadi, 2009). Thus it is against this backdrop that this research study attempts to investigate the impact of using multimedia and hypermedia as a mean of instructional delivery for basic electricity students in technical colleges in Nigeria using Oyo State as a case of study

### **Statement of the Problem**

The conventional method of instruction used in teaching Nigeria technical colleges subjects remains the uses of chalk and talk method of instruction otherwise regarded as teacher centered (Adamu, 2016, Umaru, 2015., Langa, 2013., Udofia & Udofia) but lacks flexibility in terms of when, there and how teaching and learning takes place beyond the confines of the classroom and schools' activities. Thus the present of lecturing method of instruction used in training students of basic electricity is not adequate in preparing ground for the students to contribute meaningfully to modern day of emerging technological advancement of the Nation.

In view of this above development, this sordid state of affairs result to poor academic achievement of the students at the end of their terminal examination which is becoming alarming rate and discouraging as being confirmed by National Board for Technical and Business Examination Board. This unbearable dismal academic achievement has been a major source of concern for the country because of it severe consequences which is the non-attainment of the much desired objectives of training and producing competent technicians from technical colleges in Nigeria.

However in the light of the numerous flexible alternatives available means of teaching and learning of using ICT. It therefore becomes paramount for the teachers of basic electricity to exploit innovative

modern e- learning techniques such as the uses of multimedia and hypermedia instructional method that is not only capable of improving the students' academic achievement or performances but likely also to enhance the acquisition of adequate knowledge and skills in technology especially in basic electricity.

Consequently, it is hope that the use of multimedia and hypermedia instructional strategies technique in teaching and learning basic electricity hoping in aspiring to bring the required results in academic achievement of both male and female students in Oyo State technical education. Hence, the problem of significant effect on the academic performance or achievement of basic electricity students in technical colleges in Nigeria would be resolved through multimedia and hypermedia instructional resource

### **Purpose of the Study**

The purpose of the study is to determine the impact of multimedia and hypermedia instructional resources on Students' academic Achievement on Basic Electricity Technology in Oyo State Government Technical Colleges. Specifically, the study determined:

1. The impact of multimedia and hypermedia instructional resources on the students' academic achievement in basic electricity
2. The impact of gender on academic achievement of the students when taught basic electricity with multimedia and hypermedia instructional resources

### **Research Questions**

Two research questions were raised for the study as follows:

1. What is the impact of multimedia and hypermedia instructional resources on students' academic achievement in basic electricity?

2. What is the impact of gender on academic achievement of students when taught basic electricity with multimedia and hypermedia instructional resources?

### **Hypotheses**

Two hypotheses were formulated and tested at 0.05 levels of significances thus:

**H<sub>01</sub>** There is no significant difference in the mean achievement scores of students taught basic electricity with multimedia and hypermedia instructional resources and those taught with conventional method

**H<sub>02</sub>**: There is no significant difference between the effect of gender on students' academic achievement when taught basic electricity with multimedia and hypermedia instructional resources

### **Scope of the Study**

The scope of the study would cover the basic electricity technology contents which include electrical installation and maintenance, appliance repairs, rewinding of transformer, assembling of electrical products as radio, fridge and many more. It would also cover all five (5) Oyo State Government Technical Colleges namely Ibadan, Oyo, Ogbomosho, Iseyin and Shaki in all where basic electricity technology subjects are offered.

### **Methodology**

The researcher adopted quasi-experimental research design for the study which comprises the pre-test, post-test and non-randomization or equivalent control group was used. The students were assigned into two groups namely experimental and control groups. The researcher randomly assigned intact classes to treatment and control groups. This was necessary in order not to disrupt the normal classes of the

students and the school timetable. This uses of intact class in a quasi-experimental design and this kind of procedure could be utilized if it is not feasible for the researcher to randomly sample the experimental subjects and allocate them to instructional teams without disruption of the normally existing instructional schedule of the students and institutions (Sambo, 2008).

The population of the study comprises one hundred (100) year three students offering basic electricity technology subject in all the five Oyo State Government Technical Colleges. All these were adopted as the sample due to its small manageable size and numbers indicating seventy (70) males and females students of basic electricity technology subject from year three students in order to have a balance gender of inequality. The reason for choosing year three students was because of students' interest in basic electricity technology subject as a career option, their level of seriousness and commitment in acquiring the electricity technology skills. The population was purportedly selected fifty (50) students as experimental group while the remaining half of the population were used as control group. The instrument for data collection was Basic Electricity Academic Achievement Test (BEAAT) on multimedia and hypermedia instructional resources. The reliability of the instrument was determined using Pearson Product Moment Correlation Coefficient which was found to be 0.85 while Kuder-Richardson (KR20) formular was used to determine the internal consistency which was conducted in Osun State two Government Technical Colleges to obtain the result of 0.78. Mean and Standard Deviation were used to answer the research questions while the Analysis of Covariance (ANCOVA) was employed to test the hypotheses that guided the study.

### **Lesson Plan**

The researcher prepared two set of lesson plan: one involves the use of instructional resources of multimedia and hypermedia to teach the students on basic electricity technology subject while the other lesson plan was on conventional method (without instructional sources). The two lesson plans were given to experts in basic electricity technology subject to have their inputs and ensuring the conformity

with the Nation Board for Technical Education syllabus and guidelines. The researcher trained the electrical teachers on the use of lesson plan and the conduct of the questions that would be administered to students after the two methods of lesson plan must have been administered to students. At that junction, the details of instruction and the procedure of the test were outlines for the students based on teachers' activities and student activities was explained on the test for the students.

## Results and Discussion

**Research Question 1:** What is the impact of multimedia and hypermedia instructional resources on students' academic achievement in basic electricity?

**Table 1: Pretest and Posttest Mean Scores of Experimental and Control Groups**

Group	N	Pretest	Posttest	Main Gain
		X	X	
Experimental	50	22.63	28.73	6.1
Control	50	15.20	16.48	1.28

**Field Survey 2022, N=Number, X=Mean**

The data presented in table shows that the experimental group had a mean score of 22.63 in the pretest and a mean score of 28.73 in the posttest, hence the pretest main gain of the experimental group was 6.1. Meanwhile, the control group had a mean score of 15.20 in the pretest and a posttest mean of 16.48. Thus producing pretest, posttest main gain of 1.28. Since the mean gain of the experimental group 6.1 was greater than the mean gain of the control group. Consequently, this result affirms that the experimental group performed that were taught with the multimedia and hypermedia instructional resources performed better than the control group that were taught with conventional method.

**Research Question 2:** What is the impact of gender on academic achievement of students when taught basic electricity with multimedia and hypermedia instructional resources?



**Table 2: Pretest and Posttest mean scores of male and female students taught basic electricity with multimedia and hypermedia instructional resources and those taught with the conventional method.**

Gender	Multimedia and Hypermedia Instructional Resources				Conventional Method			
	Mean Gain				Mean Gain			
	N	Pretest	Posttest	X	N	Pretest	Posttest	X
Male	70	21.84	28.65	6.81	70	22.27	28.73	6.46
Female	30	21.97	26.80	4.83	30	22.20	25.43	3.23

Field Survey 2022, N=Number, X=Mean

Table 2 shows that male students taught basic electricity with multimedia and hypermedia instructional resources had a mean score of 21, 84 in the pretest and a mean score of 28.65 in the posttest making a pretest and posttest main gain for the male and female taught basic electricity with multimedia and hypermedia instructional resources of 6.81 and 4.83 respectively. But male and female students taught basic electricity with conventional method recorded pretest scores of 22.27 and 22.20 while the posttest scores of 28.73 and 25.43 with main gain of 6.46 and 3.23 respectively. With these results male students taught basic electricity with multimedia and hypermedia had higher main gain scores than female students taught with conventional method. Consequently, it can be reaffirmed that there is an effect of using multimedia and hypermedia attributable to gender on the performance of students taught basic electricity.

## Hypotheses

**H<sub>01</sub>:** There is no significant difference in the mean achievement scores of the students taught basic electricity with multimedia and hypermedia instructional resources and those taught with conventional method.

**Table 3: Summary of Analysis of Covariance for test of Significance between the mean scores of Experimental and Control Groups in the Achievement test and effects on Gender on the treatments given to the students**

Source	Sum of Squares	df	Mean Squares	F	Sig
<b>Corrected Model</b>	3742.034	4	935.509	68.868	.000
<b>Intercept</b>	8036.005	1	8036.005	591.575	.000
<b>Pretest</b>	20.283	1	20.283	1.493	.224
<b>Group</b>	3178.541	1	3178.541	233.990	.000
<b>Gender</b>	42.978	1	42.978	3.674	.025
<b>Group *Gender</b>	4.111	1	4.111	1.002	.305
<b>Error</b>	316.443	279	3,786		
<b>Total</b>	48999.000	284			
<b>Corrected Total</b>	134.431	283			

**Significant at Sig of  $F < .05$  Field Survey 2022, Df= and F=**

The data presented in Table 3 shows F-calculated values for mean scores of experimental and control groups in the achievement test and gender on students 'achievement in basic electricity. The F-calculated value for group is 233.990 with significance of F at .000 which is less than .05. The null-hypothesis is therefore rejected at .05 level of significant difference. With this result, there is a significant difference between the mean achievement scores of students taught basic electricity with multimedia and hypermedia instructional resources and those taught with conventional method. The F-calculated value for gender is 3.674 with a significance of F at .025 which is less than .05. This means that there is significant difference between the effects of gender on students 'achievement in basic electricity. Therefore, the null- hypothesis of no significant difference between the effect of gender (male and female) of students' achievement in basic electricity is rejected at.05 level of significance.

## Discussion of Findings

The answer to research question one was provided by the data presented in table1. The information contained in the table revealed that the experimental group taught with multimedia and hypermedia instructional resources had higher posttest mean scores than those taught with the conventional method. Similarly, the analysis of covariance which was used to test the first hypothesis (table3) also revealed that there was a statistically significant difference between the effect of multimedia and hypermedia instructional resources on the students' achievement in basic electricity.

The interpretation of this finding is that the use of multimedia and hypermedia instructional resources is more effective than the conventional method in terms of improving the students' achievement in basic electricity technology. This concurs with the finding of similar researches conducted by Anekwe, (2016), and Adamu, (2016). The researchers individually investigate the effect of multimedia on academic achievement of students using control groups and their findings unanimously agreed that the experimental group taught with computer instructional resources such as those of multimedia and hypermedia performed better than the group taught with traditional method of instruction. The finding clearly showed that the multimedia and hypermedia instructional resources are more effective in improving the students' academic achievement in learning might not be unconnected with the fact that approach is a student-centered teaching method that uses of e-learning resources to facilitate information sharing outside the constraints of time and place among a network of people. This assertion is in line with the view of Adamu (2016) that one of the major elements of the e-learning instruction is that teaching and learning process can take place at different time and place, thus it allows students to schedule their learning activities their own pace of time and place. This finding is most likely attributable to the fact the multimedia and hypermedia tools and learning environments provide a high degree of interactivity between the student and course materials. The students can work either individually or in

group, through which the task of course materials assigned by the teacher can be reviewed at their own pace, time and at their convenience and be well studied again and again.

Analysis of covariance was used to test the first hypothesis table 3 . The result shoes that at the calculated F value of 18.514 with a significance of .00 and confidence level of .05, there was a significance difference in the achievement of students. The interpretation of this result is that the use of multimedia and hypermedia instructional resources are more effective than conventional method in improving students' academic achievement in basic electricity.

The result of the data in table 2 revealed that male had a higher mean score in basic electricity academic achievement test conducted than female. This however, indicated that the multimedia and hypermedia instructional resources used in teaching the gender improved the performance of the gender but the male is significantly greater than female based on the high recorded of mean score. Similarly, table 3 result through the analysis of covariance shows there was significant difference between the main effects of gender on students' achievement in basic electricity which was confirmed and affirmed that the difference between male and female students in basic electricity was statistically favoring male students. The study of finding are in line with and Adamu (2016) on their different research study on e- learning instruction techniques for teaching and learning in colleges of education.

## Conclusion

In the light of the availability of numerous flexible alternative means of teaching and learning using ICT tools, it therefore, becomes paramount for the teachers of basic electricity to exploit innovative modern

e-learning techniques such as the use of multimedia and hypermedia instructions. It is against background that this study was carried out to determine the effect of multimedia and hypermedia instructions resources in Oyo State Government Technical College students' academic achievement in basic electricity. The study found out that multimedia and hypermedia instructional resources were effective in enhancing student achievement in basic electricity. The study findings showed that there was a significant difference between the main effects of gender (male and female) on students' achievement in basic electricity was confirmed in favouring the male. In view of the use of innovative e-learning platform is a viable teaching method which is not only capable of improving the students' academic achievement but it is also capable of stimulating the students' interest in learning and above all, enhances their learning retention. Conclusively, it is therefore, implies that adopting these instructional approaches teaching and learning is an assurance of producing good component, qualified graduates that will teach basic electricity in government technical colleges and more importantly to keep up with the rapid technological advancement in the field of electrical technology.

### **Recommendations**

The following recommendations were proffered base on the findings of the study thus:

- The management of the institution under which the study was carried should adopt the use of multimedia and hypermedia instructions in teaching.
- The management in collaboration with Oyo State should mount intensive capacity building programme for the teachers on the use of the multimedia and hypermedia instructions resources
- Provision should be made for the easy and regular use of multimedia and hypermedia mode of instructions
- Seminar should be organized for the students on how to make use of multimedia and hypermedia instructions.

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