The Male and Female Students Mean Achievement Scores of Technical Schools in electricity concepts using E-learning Teaching Activity and Lecture Method

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Abstract: **The study determines the male and female students mean achievement scores of technical schools in electricity concepts using e-learning teaching activity and lecture method. Two research questions and two hypotheses were used. The study adopted a quasi-experiment designof non-randomized group pretest-posttest design. The population of the study was 6 Technical schools and 724 part II Students in the 2013/2014 academic session. The sample size was 223 (139 male and 84 female) out of the 724 of part II students of technical school college. A multi-stage sampling technique was employ for the study. Purposive sampling technique was used to select 2 Technical Schools (TS) which were co-educational (1 for control and 1 for experiment group). Again, a purposive sampling technique was used to select only part II students' classes in the schools for the study. Two instruments were used for data collection, which included Electricity Achievement Test (EAT) and Electricity Interest Inventory (EII). Means and standard deviation were used to answer the research questions. Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance. The results of the male and female students mean achievement scores of technical schools in electricity concepts using e-learning teaching activity and lecture methodwas not statistically significant. Both male and female technical schools students in education zone B of Benue State in the 2013/2014 academic session showed more interest and achieved higher in electricity lessons.**

Keywords: **Male, Female, Mean Achievement Scores, E-learning Teaching Activity, Lecture Method**

I. INTRODUCTION

Electricity is one of the major topics in physics studied and taught in technical secondary and pre-tertiary schools as well as tertiary institutions in Nigeria. The understanding of electricity-related concepts, such as electric current, voltage, and resistance form the bases or prerequisite for the understanding of topics like series and parallel circuits, electric potential, electric energy as well as other concepts in physics. However, several studies have indicated that many students in science classes have difficulties in understanding and learning of these concepts. For instance Iorber, Fatoki and Ochedikwu (2015) studied students' understanding of direct current resistive electrical circuits and found that both secondary school and university students reasoning pattern regarding direct current resistive electric circuits often differ from the currently accepted explanations. This implies that many beginning electrical students have hard times understanding basic concepts of electrical circuits which arise due to the fact that students cannot see electric charge carriers (electtrons) move through electric wires (Pfister, 2004). Not been able to understand these topics contributes to poor performance of tests and it negatively affects the students in learning further concepts in electricity. The Chief examiner announced the 2014 May/June national Business Certificate (NBC) and National Technical Certificate (NTC) examination results and stated that one of the areas students had difficulties and weakness was answering questions on electricity related concepts.

Despite the importance of electricity concept as one of the fundamental ingredients of technology, it is plagued with persistent poor achievement and consequential low enrolment at the tertiary institutions (Njoku, 2007). With the increasing importance of electricity in physics to the unfolding world, the mean achievement of Nigerian male and female students in the subject at the technical school remains very poor (Saage, 2009). Several factors had been advanced to this poor achievement such as sex factor, student factor, teacher factor, societal factor, the governmental infrastructure problem, language problem, examination body related variables, curriculum related problems, textbook related problems and home related problems (Korau, 2006). Further, Korau stated that students' poor primary background in science, lack of incentives for test, lack of interest on the part of the students, students not interested in hard work, incompetent teachers in the primary school, large classes, traditional method of teaching, fear of psychologically between male and female folk had made the subject un-interesting to the students among others caused students' poor achievement.

Gender is a concept used to distinguish femininity and masculinity from biological sex (Imoko, 2004). It is said to be one of the factors affecting students' social-cultural and academic phenomena. On the other hand, Esiodu (2005) reported in his study that gender did not influence achievement significantly. Studies conducted on gender

showed that there were inconsistencies on the conclusions reached by some researchers.

E-learning teaching activities are pedagogical strategies whereby a teacher plans his/her lesson in a manner that electronic gadgets are used to disseminate knowledge to the students (Helen, 2005). E-learning was viewed by Sundus (2014) as a pedagogical process that involved the use of the internet, intranets/extranets, audio and videotapes, satellite broadcast, interactive TV, and CD-ROM for comfortable delivery and for interaction between members.

Over the last two decades, a body of evidence in literature has echoed the need for science educators to understand male and female students' understanding of science concepts, process and phenomena as a perquisite to improving teaching and learning in science (Nwagbo and Obiekwe, 2010). Surprisingly, most physics teachers hold to the belief that the most appropriate ways of communicating knowledge is via the conventional 'talk and chalk' strategy (Ada, 2010). This study therefore sought to find out the male and female students mean achievement scores of technical schools in electricity concepts using e-learning teaching activity and lecture method.

Research Questions

The study was guided by the following research questions:

i. What are the mean interest ratings of male and female technical school students taught electricity using e-learning teaching activities?
ii. What are the mean achievement scores of male and female technical school students taught electricity using e-learning teaching activities?

Research Hypotheses

The following hypotheses were formulated and tested at 0.05 level of significance:

i. There is no significant difference in the mean interest ratings of male and female technical school students taught electricity using e-learning teaching activities.
ii. There is no significant difference between the mean achievement scores of male and female technical school students taught electricity using e-learning teaching activities.

II. METHODOLOGY

Research design

Thisstudyadopted a quasi-experiment design of non-randomized group pretest-posttest design. The intact classes of the students were randomly assigned to the experimental and control groups.

Area of the study

The study was carried out in Benue State, Nigeria. The state is made up of three educational zones, A, B, and C with twenty three local Governments areas as follows, Zones   A

(7), B (7), and C (9). The specific area of study was zone B where achievement and interest of students in physics in the technical schools was generally poorwhere there exist better populated and more Technical Colleges in this zone than any other in the state.

Population of the study

The population of the study consisted of 6 Technical schools and 724 part II Students in Education Zone B in the 2013/2014 academic session. This number was made up of 543 males and 181 females. The class was chosen because it was stable as part I were just coming in and part III were preparing for their final examination.

Sample and Sampling Technique

The sample size was 223 (139 male and 84 female) out of the 724 of part II students of technical school college. A multi-stage sampling technique was employ for the study. Purposive sampling technique was used to select 2 Technical Schools (TS) which were co-educational. 1 TS was for control and 1 TS for experiment group. Again, a purposive sampling technique was used to select only part II students' classes in the schools for the study. Then, simple random sampling technique was used to select the control and experimental schools' intact classes for the study.

Instrument for Data Collection

Two instruments were used for data collection, which included Electricity Achievement Test (EAT) and Electricity Interest Inventory (EII). The EAT comprised of 30 items of 4 options questions based on recommended curriculum. The items were structured on the levels of difficulties to ascertained thorough understanding of the electricity concept by students. For EII, the researcher used EII instrument invented by Koller, Baumert and Schnabel (2001) and modified to suit the purpose of measuring interest of students in Electricity with items of interest scale that provide responses on a continuum of very high =4, high=3, low =2. Very low =1 to suit the study. Also, two types of lesson plan were drafted. One lesson plan was for the experimental group which was e-learning teaching activities. A second lesson plan for the experimental group was lecture method.

Method of data collection

The instruments were administered to the students in both groups as pretest to measure their level of knowledge in the electricity concepts and their interest in physics generally. Both instruments were retrieved immediately. Then, the students were taught (treated) the electricity concepts using the lecture method (LM) in the control method and e-learning teaching activities (ELTA) in the experimental group. After the treatment, the instrument were reshuffled and administered after the treatments as post-test. The process was assisted by their usual class teachers.

Method of Data Analysis

Means and standard deviation were used to answer the research questions. Analysis of Covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance.

III. RESULTS

The results of Table 1 which answer research question one revealed that the pretest mean interest ratings of both male and female students were 1.73 and 1.76, while the standard deviation were 0.21 and 0.24 respectively. The mean difference of both groups was 0.03 which showed that subject study was at the same level of ability before the commencement of the study. Also, the posttest mean interest rating for male students was 3.60 and standard deviation was 0.39 while female students had the mean interest rating of 3.63 and standard deviation of 0.36. The mean difference was 0.03; this showed that there was an improvement in the interest of both male and female in electricity, but the female students showed higher interest rating since the mean difference was higher than the male mean difference by 0.03.

Table 1: Mean interest ratings of male and female technical school students in e-learning Teaching activities.

		Pre-test		Post-test	
Source	N	$\overline{X}$	SD	$\overline{X}$	SD
Male Students	46	1.73	0.21	3.60	0.39
Female Students	35	1.76	0.24	3.63	0.36
Mean Difference		0.03		0.03	
Total	81				

In Table 2, reading across row heading Gender, $F_{(1, 78)}$ with df = 1 and p-value of .977 which was greater than the set p-value of 0.05. Since p>0.05, the hypothesis which stated that there is no significant difference in the mean interest of male and female students taught electricity using ELTA was not rejected. Hence, the male and female technical school students' equally improved in their interest in electricity concepts taught during the period of this study.

Table 2: ANCOVA, Result of Technical Schools Students' Interest Rating of male and female Students in E-learning Teaching Activities

Source	Type III Sum of Squares	df	Mean Square	F	Sig
Corrected Model	6.872[a]	2	3.436	62.797	.000
Intercept	2.252	1	2.252	41.150	.000
PreTestInt Total	6.851	1	6.851	125.215	.000
Gender	4.666E-5	1	4.666E-5	.001	.977
Error	4.268	78	0.055		
Total	1067.534	81			
Corrected Total	11.140	80			

a.   R Square= .617 (Adjusted R Square = .607)

In Table 3, the pretest mean achievement scores of both male and female students were 2.41 and 2.51 while the standard deviations were 1.09 and 1.20 respectively. The mean difference of both groups was initially 0.10 which showed that the subject of study was at same level of ability before the commencement of the study. Also, the posttest mean achievement scores for male students was 13.71 and standard deviation was 3.65 while female students had the mean achievement of 13.85 and standard deviation 3.74. The mean difference was 0.14. This showed an improvement in the achievement the technical school students' in electricity.

Table 3: Mean Achievement Scores of Technical Schools Students in E-learning Teaching Activity and Lecture Method

Source	N	Pre-Test $\overline{X}$	SD	Post-test $\overline{X}$	SD
Male students	46	2.41	1.09	13.72	3.65
Female Students	35	2.51	1.20	13.86	1.20
Mean difference		0.10		0.14	
Total	81				

In table 4, reading across row heading Gender, $F_{(1, 78)}$ with df= 1 and P-value of 162 which was greater than the set P-value of 0.05. Since p>.05, the hypothesis which stated that there is no significant difference between the mean achievement scores of male and female students taught electricity with ELTA is not rejected. Hence, the male and female technical school students equally improved in their achievement in electricity concepts taught during the period.

Table 4: ANCOVA, Result of male and female Students mean achievement scores in E-learning Teaching Activities.

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	1049.413[a]	2	524.706	1539.365	.000
Intercept	479.614	1	479.614	1407.075	.000
PreTestAchmnt	1049.025	1	1049.025	3077.590	.000
Gender	0.680	1	.680	3077.590	0.162
Error	26.587	78	.341	1.994	
Total	16452.000	81			
Corrected Total	1076.000	80			

a.   R Square = .975 (Adjusted R Squared = .975)

IV. DISCUSSION

The finding of this study revealed that there was no significant difference between mean achievement scores of male and female students taught electricity with ELTA. This finding was in agreement with Achufusi and Mgbemana (2013) and Wombo (2014) who agreed that with provision of equality of educational experiences with suitable instructional method, inequality of students' learning outcomes for male and female students was not expected. This was so because both male and

female students enjoyed the teaching like to solve electrical problems.

This finding revealed that there was no significant difference in mean ratings of male and female students taught electricity with ELTA. This finding was in agreement with Oluwadere (2012) and Wombo (2014) who stated that the use of ICT by both male and female student was not different significantly and that both showed equal feeling towards solving electrical problems interestingly.

V. CONCLUSION

Both male and female technical schools students in education zone B of Benue State in the 2013/2014 academic session showed more interest and achieve higher in electricity lessons.

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