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Effect of Audio-Visual Technology on Students Academic Achievement and Interest in Electrical Installation and Maintenance Works in Technical Colleges in Anambra State

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Abstract

This study was conducted to determine the effect of audio-visual technology on students' academic achievement and interest in electrical installation and maintenance works in Technical Colleges in Anambra State. The design of the study was quasi-experimental design involving pretest, posttest non-randomized control groups. The study was carried out in technical colleges in Anambra State. The population of the study was 316 (150 males and 166 females) students purposively sampled from two technical colleges that have male and female students in the state. The instrument for data collection was electrical installation and maintenance works achievement test (EIMWAIT) and interest scale adapted by the researchers from the NABTEB past questions between 2010 and 2020. Due to the fact that the instrument was standardized (past examination questions), no further validation was made. Reliability of the instrument was determined using Kuder-Richardson Formula 21 with a reliability coefficient of 0.77 was obtained. Data collected were analyzed using mean scores to answer the research questions and Analysis of Covariance (ANCOVA) to test the null hypotheses at 0.05 level of significance and appropriate degree of freedom. The study revealed among others that students in experimental group achieved higher than those in control group. There is a significant difference in the mean achievement scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method. Thus, it was recommended that there should be a regulatory policy to encourage absorbance of female students into electrical installation and maintenance works trade.

Keywords: audio-visual technology, electrical installation, (EIMWAIT).

INTRODUCTION

Technical college can be defined as a skill-enriched institutional type primarily established for impartation of all round knowledge and skill into an individual for societal relevance. Technical colleges according to Okoro (2008) are principal vocational institutions in Nigeria which are designed to prepare the individual to acquire practical skills, knowledge and attitude required of craftsmen and technicians at sub-professional level. With this view, skills required for proper functionality and adaptability could be said to be the aim of technical education as offered at technical colleges. Thus, different trades are offered in technical colleges. The trades offered in technical colleges as stated by Federal Republic of Nigeria in its National Policy on Education (FRN: 2013) include: building trades; beauty culture trades; computer craft practices; painting; wood work trades; printing trades, textile trades, hospitality trades, mechanical trades and electrical engineering trades.

However, electrical engineering trades as offered in technical colleges in accordance with the National Policy on Education covers different areas of specialization. According to the National Board for Technical Education Programme (NBTE 2012), Electrical/electronic offers trade in; appliances maintenance and repairs, instrument mechanics and radio, television and electronics work, electrical installation and maintenance works.

In view of the afore-mentioned, electrical installation and maintenance works plays immeasurable

role in equipping recipients with excellent competencies for the utilization of trending electrical technological devices. According to Ogwa (2015), the objectives of electrical installation and maintenance works trade is to give training and impart needed skills to technical college students in that area to enable them secure employment in recognized organization, create job or become self-reliant economically. Onoh and Onyebuenyi (2017) stated that electrical installation trade also equips an individual with functional and saleable skills, knowledge and attitude or value that would enable him operate in rendering service in electrical related institution or work. Hence, Njoku (2008) highlighted the goals of electrical installation trade to include:

- To empower individuals with desirable skills, knowledge and values to perform specific function in electrical installation area so as to become self-reliant after graduation.
- To empower individual in such a manner that will develop his intellectual capacities and help him to make informed decision in all aspects of life.
- To enable the graduate at this level desire to acquire higher vocational training and up skill his occupation. Ogwa and Nnachi (2016) added that electrical installation and maintenance work provides technical training to meet the demands of electrical industry and the needs of the individual allowing the students to identify their career objectives. These objectives could actualized through effective teaching resulting from the adoption of favorable instructional material and method.

Instructional materials in the context of this study can be defined as universally accepted items/facilities (printed and non-printed) that can be utilized in the teaching and learning activities. The materials can be said to have significant impact on how the learners learns, understands and retain content of lessons. Adunola (2011) added that in order to bring desirable changes in students, teaching and methods including materials used by educators should be best for the subject matter. These items may include but not limited to audio-visual technology (materials).

Audio-visual technology in this context can be seen as materials both printed and non-printed employed in the teaching and learning activities. These technologies can be widely employed in the classroom in making abstract things, ideas and concepts real. According to Anzaku (2011) audio-visual materials are commonly used to refer to those instructional materials that may be used to convey meaning without complete dependence upon verbal symbols or language. Audio-visual is defined according to Adamu, Ibrahim, Adamu and Ibrahim (2018) as the combination of various digital media types such as text, images, sound and video, into an integrated multi-sensory interactive application or presentation to convey a message or information to an audience.

However, audio-visual materials can be said to be immensely relevant as it fosters learning by stimulating learners interests, reduces fatigue as abstract things are made concrete and as well lessen teaching burden on the teacher. Eze (2013) stated that the human being learns more easily and faster by audio-visual processes than by verbal explanations alone. Ngozi, Samuel and Isaac (2012) agreed that audio-visual materials are very important and useful in education because, the normal learner in so far as the functions of his preceptor mechanisms are concerned, gains understanding in terms of multiple impression recorded through the eye, ear, touch and other series.

Similarly, Nathan (2010) stated that audiovisual materials are usually described as “non-print” documents. The author maintained that audiovisual materials include audio (sound) recordings/aids, film and video, graphic materials, three dimensional objects, maps, and microforms. Ogunbote and Adesoye (2013) expressed that audio visual technology adds new dimension to learning experiences because concepts were easier to present and comprehend when the words are complemented with images and animations. The authors stressed that it has been established that learners retain more when a variety of senses are engaged in impacting knowledge; and the intensity of the experience aids retention and recall by engaging social, emotional and intellectual senses. Thus, leading to improvement in academic achievement and interest of students.

Academic achievement can be defined as the process of attaining a height in teaching and learning. Busari (2014) stated that academic achievement is the display of knowledge attained or skills developed in the school subject. Ncharam (2010) noted that the yardstick for measuring one’s level of academic achievement should be through test and observation. Ncharam further stressed that academic achievement has three dimensions such as high, average and low academic achievements which could be as a result of interest.

Interest on the other hand can be seen passion and willingness. According to Xiuhong and Dongyi (2015), interest is a kind of awareness inclination for understanding the world and acquiring cultural and scientific knowledge. Festus and Ekpete (2012) noted that the attitudes of a student are antecedents which serve as inputs or stimuli that trigger actions as well as interests. Academic achievement and interest in this content may vary depending on gender.

According to Okeke (2001) gender refers to the social or cultural construct, characteristics, behaviours and role which society ascribes to males and

females. Similarly, Carol (2007) defined gender as a social or cultural determinant that varies from place to place or culture to culture. Gender is defined as the range of physical, biological, mental and behavioural characteristics pertaining to, and differentiating between, masculinity and femininity especially in technical colleges in Anambra State

Anambra state is one of the five states in the South Eastern part of Nigeria. It shares boundaries with Delta State to the west, Imo State and Rivers State to the south, Enugu State to the east, and Kogi State to the north. The name was derived from the Anambra River (Omambala) which flows through the area and is a tributary of the River Niger. The state is made up of 21 local government areas with Awka as the capital. According to National Population Commission (NPC, 2006) Census, Anambra State occupies an area of 4,878 square kilometers with a population of about 4,177,828. The state has six educational zones. These include Onitsha, Aguata, Nnewi, Otuocha, Ogidi and Awka educational zones.

In Anambra State there is report of poor performances of students especially in technical colleges. Onah (2011) noted that there had been report of poor achievement and subsequent abandonment of skills by technical college graduates. This could be traced to the unsatisfactory teaching which could be traced to lack of adequate instructional materials utilized in teaching and learning of electrical installation and maintenance works, leading to poor skill inculcation among technical college students. In this regards, Osmol (2012) observed that students who graduate in electrical and electronics trade do not possess the prerequisite skill to practice this technical course after graduation. Adamu, Ibrahim, Adamu and Ibrahim (2018) pointed out that teachers have to be trained in the use of audio-visual and in its integration in the classroom activities to enhance thinking and creativity among students. The authors stressed that teachers must also learn to facilitate and encourage students by making them responsible for learning.

Similarly, Ekpenyong (2014) condemned old technologies like white board and maker type applied in teaching as it was characterized by fatigue, poor relationship between students and teachers, low motivation for learning, teacher-centered and low retention of knowledge. On this note, the study sought to determine the effect of audio-visual technology on students' academic achievement and interest in electrical installation and maintenance works in Technical Colleges in Anambra State.

Statement of the Problem

The advent of products of technology and their application in all walks of life including teaching and learning activities aims at improving the quality of education and expand access to educational resources. However, the education sector in Anambra State is expected to be technologically driven as to blend into the 21st century standards as in other countries but it is disheartening that the education sector seems to be lacking the necessary technological and human resources needed to bring the Nigerian education sector to same pace with other countries. However, it becomes pitiable that in some technical colleges in Anambra State lack the necessary technologies for effective teaching and learning of electrical installation and maintenance works especially audio-visual materials like computers, projectors, audio sound system with amplifiers and others while in some other cases, the teachers lack the prerequisite skills for effective utilization of these packages. The effect of these inadequacies are evident in the slow pace of development witnessed as the education system takes heed in the production of incompetent graduates who are widely involved different forms of societal misconducts like robbery, kidnapping and drug addiction as they are not gainfully employed. Against these backdrops, is the need to determine the effect of audio-visual technology on students' academic achievement and interest in electrical installation and maintenance works in Technical Colleges in Anambra State?

Purpose of the Study

This study was set to determine the effect of audio-visual technology on students academic achievement and interest in electrical installation and maintenance works in Technical Colleges in Anambra State. Specifically, the study sought to identify;

1. The effect of audio-visual technology on mean achievement score of students in electrical installation and maintenance works
2. The effect of audio-visual technology on mean achievement score of male and female students achievement in electrical installation and maintenance works
3. The effect of audio-visual technology on mean interest score of students in electrical installation and maintenance works
4. The effect of audio-visual technology on mean interest score of male and female students achievement in electrical installation and maintenance works

Research Questions

The following research questions were formulated in order to obtain answer to the problems under investigation:

1. What are the mean achievement scores of students taught electrical installation and maintenance works using audio-visual technology as compared to those taught using conventional method?

2. What are the mean achievement scores of male and female students taught electrical installation and maintenance works using audio-visual technology as compared to those taught using conventional method?
3. What are the mean interest scores of students taught electrical installation and maintenance works using audio-visual technology as compared to those taught using conventional method?
4. What are the mean interest scores of male and female students taught electrical installation and maintenance works using audio-visual technology as compared to those taught using conventional method?

Hypotheses

The following null hypotheses were formulated for this study:

$H0_1$: There is no significant difference in the mean achievement scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

$H0_2$: There is no significant difference in the mean achievement scores of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

$H0_3$: There is no significant difference in the mean interest scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

$H0_4$: There is no significant difference in the mean interest score of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

METHOD

The design of the study was quasi-experimental design involving pretest, posttest non-randomized control groups. The study was carried out in technical colleges in Anambra State. The population of the study was 316 (150 males and 166 females) students purposively sampled from two co-education technical colleges. From the two schools sampled, one intact class each was used, giving a total of two intact classes. Simple random sampling was used to assign one intact class to experimental groups and the other intact class to control groups. The groups for the study were coded group A; comprising one experimental class and group B; control class with 162 students for experimental and 154 students for control. The instrument for data collection was Electrical Installation and Maintenance works Achievement Test (EIMWAIT) and Interest Scale adapted by the researchers from the NABTEB past questions between 2010 and 2020. It contained 50 multiple choice test items with four options (A-D) with 2 marks allocation of 0 and 100% maximum score. Due to the fact that the instrument was standardized instrument (past examination questions), only face validation was made by three experts. Reliability of the instrument was determined by administering the test to 40 electrical installation and maintenance works students from GTC Enugu State who were not part of the population but of similar characteristics. Kuder-Richardson Formula 21 was used to analyze the data and a reliability coefficient of 0.77 was obtained. Data collected were analyzed using mean scores to answer the research questions and Analysis of Covariance (ANCOVA) was used to test the null hypotheses at 0.05 level of significance. Results of the pre-test, post-test and delayed post-test were used for data analyses.

RESULTS

The results are presented in Table 1 to 8 in line with the research questions and null hypotheses that guided the study below.

Research Question 1

What are the mean achievement scores of students taught electrical installation and maintenance works using audio-visual technology as compared to those taught using conventional method?

Table 1: Mean Achievement Scores and Standard Deviation of Experimental and Control Groups

Group	N	Pre-test		Post-test	
		Mean	SD	Mean	SD
Experimental	162	5.33	1.75	13.45	2.85
Control	154	5.60	1.70	10.81	2.39

Table 1 show that the pre-test scores for experimental and control groups were 5.33 and 5.60 respectively with corresponding standard deviations of 1.75 and 1.70 respectively. The post-test mean scores were 13.45 and 10.81 for experimental and control groups respectively with corresponding standard deviations of 2.85 and 2.39. In the post-test mean score, the experimental group had mean score that is higher than that of the control group. Therefore, students taught electrical installation and maintenance works using audio-visual technology achieved higher than those taught using conventional method.

Research Question 2

What are the mean achievement scores of male and female students taught electrical installation and maintenance works using audio-visual technology as compared to those taught using conventional method?

Table 2: Mean Achievement Scores and Standard Deviations of experimental and control groups due to Gender

Group	N	Pre-test				Post- test			
		Male		Female		Male		Female	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Experimental	162	5.35	1.91	5.32	1.59	15.50	1.63	11.45	2.32
Control	154	5.79	1.65	5.44	1.74	12.61	1.90	9.30	1.57

Table 2 indicated that the mean pre-test scores of male and female students in experimental group are 5.35 and 5.32 respectively while that of male and female in control group are 5.79 and 5.44 respectively. The mean post-test scores of male and female students in experimental group are 15.50 and 11.45 respectively while that of control group are 12.61 for male and 9.30 for female. In the experimental group, the male students achieved higher mean score than their female counterpart. The same is applicable to male and female in the control group. Therefore, male students taught electrical installation and maintenance works using audio-visual technology achieved better than female counterparts.

Research Question 3

What are the mean interest scores of students taught electrical installation and maintenance works using audio-visual technology as compared to those taught using conventional method?

Table 3: Mean Interest Scores and Standard Deviations of Experimental and Control Groups

Group	N	Pre-interest		Post- interest	
		Mean	SD	Mean	SD
Experimental group	162	15.49	3.53	20.80	5.67
Control group	154	14.27	2.82	19.14	4.65

Table 3 shows that the pre-interest scores for the experimental and control groups were 15.49 and 14.27 respectively with corresponding standard deviations of 3.53 and 2.82. The post-interest scores of experimental and control groups were 20.80 and 19.14 respectively with corresponding standard deviations of 5.67 and 4.65. The experimental group obtained higher mean interest scores in the post-interest score than their control group counterparts. Therefore, students taught electrical installation and maintenance works using audio-visual technology had more interest than those taught using conventional method.

Research Question 4

What are the mean interest scores of male and female students taught electrical installation and maintenance works using audio-visual technology as compared to those taught using conventional method?

Table 4: Mean Interest Scores and Standard Deviations of Experimental and Control Groups due to Gender

Group	N	Pre-interest				Post- interest			
		Male		Female		Male		Female	
		Mean	SD	Mean	SD	Mean	SD	Mean	SD
Experimental group	162	15.54	3.39	15.45	3.69	24.85	3.67	16.85	4.33
Control group	154	13.97	2.69	14.52	2.91	22.33	2.50	16.49	4.35

Table 4 shows that the pre-interest scores for male and female students in experimental group are 15.54 and 15.45 respectively while the pre-interest scores for male and female in control group are 13.97 and 14.52 respectively. The post-interest scores for male and female students in experimental group are 24.85 and 16.85 respectively. The post-interest scores for male and female control group are 22.33 and 16.49 respectively. In the post-interest score, the male in experimental group had mean interest score that is higher than that of their female counterpart. Therefore, male students taught electrical installation and maintenance works using audio-visual technology had more interest than female counterparts.

Hypothesis 1

There is no significant difference in the mean achievement scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

Table 5: t-test results of mean achievement scores of students in experimental and control groups

Group	N	Mean	SD	T	df	Sig	Decision
Experimental group	162	13.45	2.85	8.916	314	.000	S
Control group	154	10.81	2.39				

Table 5 shows that the t-calculated value of 8.916 for method was significant at 0.000 significant level which is less than the 0.05 level of significance set for this study. Hence, the researcher rejects the null hypothesis of no significant difference. This means that there is a significant difference in the mean achievement scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

Hypothesis 2

There is no significant difference in the mean achievement scores of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method

Table 6: t-test results of mean achievement scores of male and female students in experimental and control groups

Group	N	Mean	SD	T	Df	Sig	Decision
Male	150	14.15	2.27	14.903	314	.000	S
Female	166	10.36	2.25				

Table 6 shows that the t-calculated value of 21.055 for gender was significant at 0.000 significant level which is less than the 0.05 level of significance set for this study. Hence, the researcher rejects the null hypothesis of no significant difference. This means that there is a significant difference in the mean achievement scores of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method

Hypothesis 3

There is no significant difference in the mean interest scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

Table 7: t-test results of mean interest scores of students in experimental and control groups

Group	N	Mean	SD	T	df	Sig	Decision
Experimental group	162	20.80	5.67	2.839	314	.000	S
Control group	154	19.14	4.64				

Table 7 shows that the t-calculated value of 2.839 for method was significant at 0.000 significant level which is less than the 0.05 level of significance set for this study. Hence, the researcher rejects the null hypothesis of no significant difference. This means that there is a significant difference in the mean interest scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

Hypothesis 4

There is no significant difference in the mean interest score of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

Table 8: t-test results of mean interest scores of male and female students in experimental and control groups

Group	N	Mean	SD	T	Df	Sig	Decision
Male	150	23.67	3.41	15.871	314	.001	S
Female	166	16.67	4.33				

Table 8 shows that the t-calculated value of 15.871 for gender was significant at 0.001 significant level of significance which is less than the 0.05 level of significance set for this study. Hence, the researcher rejects the null hypothesis of no significant difference. This means that there is a significant difference in the mean interest score of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method

Summary of Findings the Study

The summary of the findings are as follows:

1. Students in experimental group achieved higher than those in control group. There is a significant difference in the mean achievement scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.
2. Male students in experimental group achieved higher than their female counterpart in experimental group. There is a significant difference in the mean achievement scores of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.
3. Students in experimental group had higher mean interest score than their counterparts in

control group. There is a significant difference in the mean interest scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

4. Male students in experimental group had higher mean interest score than their female counterparts in experimental group. There is a significant difference in the mean interest scores of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

DISCUSSION OF FINDINGS

With reference to the effect of audio-visual technology on mean achievement score of students in electrical installation and maintenance works, the study revealed that students' in experimental group achieved higher than those in control group. This by implication denotes that audio-visual technology is of immense significance in enhancing the academic achievement and interest of students in electrical installation and maintenance works trade in technical colleges in Anambra State. However, the hypotheses test of no significant difference showed that a significant difference exists in the mean achievement scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method. Therefore, the null hypothesis is rejected. This findings agrees with Ngozi, Samuel and Isaac (2012) who stated that audio-visual materials are very important and useful in education because, the normal learner in so far as the functions of his preceptor mechanisms are concerned, gains understanding in terms of multiple impression recorded through the eye, ear, touch and other series.

The study also revealed that male students in experimental group achieved higher than their female counterpart in control group. There is a significant difference in the mean achievement scores of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method. Hence, the gender of the students is found to have a significant influence on the students' achievement and thus, worthwhile to explore for enhanced academic achievement of students. This finding agrees with the findings of Kassab, Abu-Hijleh, Al-Shboul and Hamdy (2015) which revealed that there was significant difference in the mean achievement scores of male and female students using PBTM.

On the other hand, the study showed that students in experimental group had higher mean interest score than their counterparts in control group. There is a significant difference in the mean interest scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method.

Male students in experimental group had higher mean interest score than their female counterparts in experimental group. There is a significant difference in the mean interest scores of male and female students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method. This finding is in line with the findings of Olaoye and Adu (2015) who stated that gender was not significant in the academic performance of students using PBTM. This is in contrary to the Dania (2014) who stated that students' performance is not determined by gender in terms of the interaction of gender and treatment on students' academic achievement.

CONCLUSION

The study anchored on the effect of audio-visual technology on students' academic achievement and interest in electrical installation and maintenance works in Technical Colleges in Anambra State. Specifically, it emphasized on effect of audio-visual technology on mean achievement score of students, effect of audio-visual technology on mean achievement score of male and female students achievement, effect of audio-visual technology on mean interest score of students and effect of audio-visual technology on mean interest score of male and female students achievement in electrical installation and maintenance works. On this course, the study have identified that students in experimental group achieved higher than those in control group. Also, there is a significant difference in the mean achievement scores of students taught electrical installation and maintenance works with audio-visual technology as compared to those taught with conventional method. However, the findings of the study have necessitated the need for effective teaching of electrical installation and maintenance works using audio-visual technology which would lead to enhanced academic performances and interest of students in Technical Colleges in Anambra State. On this note, it is believed that if these measures are strictly adhered to, there would be enhanced in academic performance and interest of students in Technical Colleges in Anambra State.

RECOMMENDATIONS

The following recommendations were made in view of the findings of the study:

1. There should be a regulatory policy to encourage absorbance of female students into electrical installation and maintenance works trade.
2. Female students should be encouraged to approach every electrical trades' subject without inferiority complex to the male students.

3. Parents and guardians are encouraged to provide the right education they can afford for their children irrespective of gender.

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