



EFFECT OF SOUND-AMPLIFICATION SYSTEM PROJECT ON STUDENTS' ACADEMIC ACHIEVEMENT AND INTEREST IN RADIO TELEVISION AND ELECTRONICS WORKS IN TECHNICAL COLLEGES, RIVERS STATE

Chiorlu, Divine Onyema, Ovundah, Azubuike and Osigbo, Kingsley Owzor

Ignatius Ajuru University of Education Rumuolumeni, Port Harcourt Rivers state Industrial technical Education Department

Abstract: The study determined the effect of sound-amplification system project on students' academic achievement and interest in radio television and electronics works in technical colleges, Rivers state. three objectives and three research questions were posed to guide the study. while three hypotheses were formulated and tested .05 level of significances. The study adopted quasi experimental design. The population for the study was 90 National Technical Certificate II. Simple random sampling technique was used populations Of the study. The instrument used for data collection is Sound Amplification System Project Achievement Test. To ensure content validity of the instrument, the instrument was validation by four experts. One in Measurement and Evaluation department and two from Department of Industrial Technical Education all from Ignatius Ajuru University of Education Rumuolumeni port Harcourt and the instrument was pilot tested. The Analysis of Co-variance was used to determine the internal consistency of the instrument. The reliability coefficient of the instrument was found to be .85. The data for the three research questions of this study was analysed using mean and standard deviation. The hypotheses were tested at .05 level of significance using analysis of covariance. The pre-test was used to control the initial differences, across the groups as well as increasing the precision due to the extraneous variables reducing error variance. The findings of the study revealed: that the students taught Radio and audio frequency amplifiers designs with sound amplification system project performed better than those taught with chalk board and demonstration method, the students taught radio and electronic systems with the sound amplification system project performed better than those taught with chalk board and demonstration method and the students taught electronic drawing with the sound amplification system project teaching aid performed better than those taught with chalk board and demonstration method. Based on findings the study three recommendations were.

Keyword: Sound-Amplification, System, Radio Television, Electronic

Introduction

Technology as an application of scientific knowledge, is the force that drives societal development through a well-planned educational programme. Education is an enlightening experience which is gain in schools or school-like environments. It is the process by which people

develop their intellectual, emotional, spiritual and physical powers so as to become fully participating members of the community. The Federal Republic of Nigeria on her National Policy on Education (2004), viewed education as an instrument for national development, in this end, the formulation of ideas, their integration for national

Management and Human Resource Research Journal

An official Publication of Center for International Research Development

Double Blind Peer and Editorial Review International Referred Journal; Globally index

Available www.cirdjournal.com/index.php/mhrrj/index; E-mail: journals@cird.online



development, and the interaction of persons and ideas are all aspects of education. This means that education is the process of training and developing the mental potentials, physical knowledge, skill and character of individuals by formal and informal schooling. It is a process for acquiring skills, relevant knowledge and habits for surviving in the changing world. Education is the foundation of any country's development. Indeed, education continues to be the instrument for achieving economically, scientific and technological growth of any nation. However, in Nigeria the educational institutions that dowers on skills acquisition are called technical and vocational education and training institutions.

Technical, Vocational Education and Training (TVET) is an educational training that an individual receives which equips him or her with functional and relevant knowledge, skills and aptitudes in relation to the three domains of education necessary for creating/securing, progressing and maintaining an occupation which leads to production of perfect and an educate-ably self-reliant person. Different scholars, governments, and world bodies have however, consider TVET from different perspectives. Federal Government of Nigeria (2013) defined TVET as those aspects of education process involving, in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sections of life. The goals of TVET as stated in the National Policy on Education (NPE) (FRN, 2013), shows the efficacy of TVET in repositioning the economy if properly implemented and giving rightful place in the scheme of things. However, the institutions that deliver TVET programme are called TVET institutions among which include technical colleges.

Technical colleges are concerned with production of technicians who are skilled in different fields of human endeavour. The types of technicians produced at technical college level include: electronic/electrical technicians, automobile metalwork technicians, building/woodwork

technicians, and so on. Training of technicians at technical college involves imparting both theoretical and practical knowledge to the students under the guidance of the teacher within the school environment. Students at technical colleges are exposed to different skilled areas, through which one can be trained to become a self-reliant technician. This type of education received at technical college level is known as technical education. Technical education is an aspect of education that leads to acquisition of practical and applied skills as well as basic scientific knowledge. At technical college level, technical education is provided to impart technical/occupational skills in the areas of metalwork, woodwork, automobile, electricity, Radio Television and electronic works (RTVEW). Radio Television and electronic works (RTVEW) trade involve the study of the scientific application of electronic circuits, appliances and products. Radio Television and electronic works at technical colleges is aimed at imparting the necessary skills leading to the production of craftsmen and women, technicians and other skilled personnel who will be enterprising and self-reliant (NBTE 2010). According to Republic of South Africa (2018), radio television and electronic works (RTVEW) trades focused on the application and understanding of electrical and electronic principles and technological processes, inherent in the production of electrical/electronic products and system in order to improve the quality of life. Furthermore, teaching and learning of radio television and electronic works (RTVEW) trades as a specialized area is vital in the production of workforce with great understanding in diverse skills in the design, development, production, management and utilization of trending electronics devices and digital circuits. With the same mindset, Ogbuanya, et al (2017) stipulated that radio television and electronic works (RTVEW) trade is a field of study that provides both theoretical and practical knowledge of electrical/electronic devices and circuits. Hence radio television and electronic works (RTVEW) trades syllabus is designed to provide its students the necessary skills, fundamental knowledge both



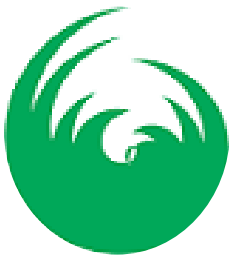
theoretically and practically for a lifelong career in the field of electrical/electronic through design, installation, operation and maintenance of electrical/electronic devices. An electrical/electronic drawing is a type of technical drawing that shows information about power, lighting and communication for engineering or architectural project. Any electrical working drawing consists of "lines, symbols, dimensions, and notations to accurately convey an engineering's design to the workers. An electronic circuit is composed of individual electronic components such as resistors, transistors, inductors and diodes connected by conductive wires or traces through which electric current can flow. Electronic device is a device that controls the flow of electrons in a circuit. They are the main building blocks of electronic circuits. According to national board for technical education (NBTE, 2010), on the completion of electrical/electronic devices and circuit module the students should be able to: Understand the basic principles and characteristics of common electronic devices; Know the application of the characteristics of common electronic devices; Know the principles of construction of Integrated circuit (IC), and the principles of operation of oscilloscopes; Understand the principles of operation of power supply; Know the basic principles of design of simple electronic circuits; Know the principle of operation of common oscillator circuits and their applications; Know the use of binary numbers and Electronic gates; Understand the principles of modulation and demodulation and Know the various electronic devices/equipment and their uses in radio and audio frequency amplifiers designs.

The objectives of radio and audio frequency amplifiers designs in technical college are to equip students with the knowledge to understand the principles of operation of Oscillators, Radio frequency Amplifiers, Audio-frequency Amplifiers and their operations (NBTE, 2010). A radio frequency power amplifier is a type of electronic amplifier that converts a low-power radio-frequency signal into a higher power signal. An audio power amplifier is an

electronic amplifier that amplifies low-power electronic audio signals such as the signal from radio receiver or electric guitar pickup to a level that is high enough for driving loudspeakers or headphones. Audio power amplifiers are found in all manner of sound systems.

It is the final electronic stage in a typical audio playback chain before the signal is sent to the loudspeakers which required a trained electronic technician or craftsmen to understand its' operational principles. National Board for Technical Education (NBTE, 2011) stated that on completion of the module of radio and audio frequency amplifiers designs, the students, should be able to design and understand construct Radio frequency Amplifiers. NBTE, (2011) further stated that the students should be able to identify types of electronic systems and their applications, and build in electrical/electronic devices and circuit in technical college. This entails a standard shift from total dependence on traditional school desk and board technique. Therefore, the institutional involvement in developing a good learning environment and malleable training is highly imperative for students' academic achievement in Technical Colleges.

Achievement is the aggregate of each students' demonstrated learning, knowledge, skills ability and indeed cognitive, affective and psychomotor domains (Wheeler, 2014). Students' academic achievement relates to what somebody has succeeded in doing, usually by efforts, skill, or courage, and a level of knowledge attained. It is the measurement of the learning outcome of a student, and it is measured with tests and examination. Achievement comes with having interest that is why Harackiewicz and Hulleman (2010) stated that interest it is a predictor for achievement. However, Interest is that which drives ones' desires to achieve a particular set goals. In an academic setting, students' academic achievement connotes performance in a school subject as symbolized by a score or mark on test or examination (Uwalaka & Offorma, 2015). Meanwhile, records show low academic achievement in electrical and electronic subjects of which



radio television and electronics works is among are due mainly to abstract contents and ways of delivering them. Another unpleasant issue is the incessant poor academic achievement of students that have completed their modules in the annual national examination conducted by the National Business and Technical Examination Board (NABTEB, 2017). Also, notable, was the fact that annual failure had been recorded in the electrical and electronic subjects in the May/June NABTEB examinations, as revealed by NABTEB External Examiner's Report (2012-2018). The result released by the registrar and chief examiner of NABTEB, according to Aorangi, (2012), on August 29, 2012, revealed that only 23.4% of candidates passed the NABTEB examination held in May/June 2012 across the country.

Good understanding of practical contents in radio television and electronics works is essential, both for adopting related ideas and to facilitate critical thinking when faced with challenges of providing a solution to workplace problems (Aina, 2011). Several reasons are attributed to the difficulties encountered in the teaching and learning of these practical contents in electronics subjects, such reasons include lack of resource-based materials, incompetent teachers, inappropriate teaching tools, methodology, technique used, among others (Eze et al, 2013). A study by Abraham and Reiss (2013) also revealed that the reasons for not reaching the aims in lessons involving practical scientific concepts like resonance in electrical circuit was because of the traditional teaching approach employed. Ambrose, et al (2010) confirm the claims of electrical subject teachers, that they encounter difficulty in making students understand those practical contents. WenchieBakaç *et al* (2011) claimed that the inability of the method to bridge the gap between practical and reality of a subject as experienced in teaching some practical topics in electronic subjects is based on the demonstration method of instruction. Therefore, failure rate in NBTE and NTC examinations in radio television and electronics works, the

foreseen incompetence in labour market and the fear for economic scarceness due to unemployment is imminent on graduates of technical colleges who could not obtain quality skills training.

The above gap gave rise to investigation into the effect of sound-amplification system project on students' academic achievement and interest in radio television and electronics works in technical colleges, A Sound amplification system is a device that amplifies the teacher's voice in the classroom. It works by providing an amplified signal in an area of the classroom determined by the placement of speakers. According to Education Queensland. (2000), Sound amplification system helps to overcome difficulties created by noise because it amplifies the teacher's voice and so the teacher's voice is heard more easily over the background noise. It helps the students to hear the teacher more clearly and less distracted by noises outside the classroom. Sound amplification system project is a form of project teaching methods where the learners are engaged with practical activities on the quest for producing sound amplification system to reduce classroom distraction caused by noise. Project-based teaching method is practical oriented and student-centred approach to teaching. It fosters critical thinking, problem solving and philosophy of learning by doing, which helps to motivate interest and enhance achievement in trades like radio television and electronics works (Okoro 2013).

This research work depicts the Sound amplification system project which is regarded according to Roberts and Chen (2015) as a likeness of something and a representation of reality. A Sound amplification system can be constructed and used in teaching some specific radio television and electronics works parts such as electrical/electronic drawing, electrical/electronic devices and circuit, Radio and audio frequency amplifiers designs, Radio and Electronic Systems, workshop safety and Television among others; for quick delivery of radio television and electronics works on the technical teachers' side and understanding on the students' side. It is of this



light the study sort to examine the effect of sound amplification system project on students' academic achievement and interest in radio television and electronics works in technical colleges in Rivers state

Reason for the Study

The reason for the study is to determine the effect of sound amplification system project on students' academic achievement in radio television and electronics works in technical colleges in Rivers state. Specifically, the study sought to investigate the effect of:

1. sound amplification system project on students' academic achievement in electrical/electronic drawing in technical colleges in Rivers state
2. sound amplification system project on students' academic achievement in Radio and Electronic Systems in technical colleges in Rivers state
3. sound amplification system project on students' academic achievement in Radio and audio frequency amplifiers designs in technical colleges in Rivers state

Research Question

The following research questions were formulated to guide the study

1. What is the effect of sound amplification system project on students' academic achievement in electrical/electronic drawing in technical colleges in Rivers state?
2. What is the effect of sound amplification system project on students' academic achievement in Radio and Electronic Systems in technical colleges in Rivers state?
3. What is the effect of sound amplification system project on students' academic achievement in Radio and audio frequency amplifiers designs in technical colleges in Rivers state?

Hypotheses

The following hypotheses were formulated and will be tested at .05 level of significance:

HO₁: There is no significant difference between the achievements mean scores of students taught

electrical/electronic drawing using sound amplification system project and those thought electrical/electronic drawing using chalk board and demonstration method in Technical Colleges in Rivers State.

HO₂: There is no significant difference between the achievements mean scores of students taught Radio and Electronic Systems using sound amplification system project and those thought Radio and Electronic Systems using chalk board and demonstration method in Technical Colleges in Rivers State.

HO₃: There is no significant difference between the achievements mean scores of students taught Radio and audio frequency amplifiers designs using sound amplification system project and those thought Radio and audio frequency amplifiers designs using chalk board and demonstration method in Technical Colleges in Rivers State

Methodology

The study adopted quasi experimental design intended to examine the effect of sound amplification system project on students' academic achievement in radio television and electronics works in technical colleges in Rivers state. Three research questions guided the study while three hypotheses formulated were tested at 0.05 level of significance. The population for the study was 90 National Technical Certificate II (NTC II) students offering radio television and electronics works in two technical colleges in Rivers state. Simple random sampling technique was used to select the two schools consisting of Government technical college port Harcourt and Government technical college Ahoada. The Government technical college port Harcourt was assigned control group while Government technical colleges in Ahoada was assigned experimental group. The two groups were intact classes. The instrument used for data collection is Sound Amplification System Project Achievement Test (SASPAT). The instrument was developed by the researcher. To ensure content validity of the instrument, the instrument was validation by four experts. One in Measurement and Evaluation department



and two from Department of Industrial Technical Education all from Ignatius Ajuru University of Education Rumuolumeni port Harcourt. To establish the reliability of the instrument, the instrument was pilot tested on 30 NTCII students at Government Technical college, Owerri.in Imo state, which is outside the area of the study but possessed similar characteristics. The Analysis of Covariance was used to determine the internal consistency of the instrument. The reliability coefficient of the instrument was found to be .85. The data for the three research questions of this study was analysed using mean and standard deviation. The hypotheses were tested at .05 level of significance using analysis of covariance (ANCOVA). The pre-test was used to control the initial differences, across the groups as well as increasing the precision due to the extraneous variables reducing error variance. The

statistical package for social sciences (SPSS version 23) was used for all data analysis in this study. With the calculated f-ratio being greater than the table or critical f-ratio, the null hypotheses were rejected. The values of calculated f-ratio being less than the table f-ratio value, the null hypotheses were accepted. The value of f-ratio at .05 level of significance and above was accepted while the value of f-ratio less than .05 level of significance was rejected.

RESULTS AND ANALYSIS

Research Question 1: What is the effect of sound amplification system project on students' academic achievement in electronic drawing in technical colleges in Rivers state?

Table 1: Mean and Standard Deviation achievement Scores of Students Taught with sound amplification system project and Students Taught using demonstration method and charts

Group	School	N	Pre-test		Post-test		Mean-diff	Mean-Gain
			$\bar{x}$	SD	$\bar{x}$	SD		
Experimental	GTC, Ahoada	44	11.69	2.204	37.82	34.82	26.13	18.88
Control	GTC PH	46	10.02	2.743	17.27	1.421	7.25	

Table 1 shows the pre-test and post-test mean score of students 'achievement in electronic drawing for both experimental and control groups. Result shows that the students in the experimental group had a pre-test mean score of 11.69 with a standard deviation of 2.204 and a post-test mean score of 37.82 with a standard deviation of 34.82 The difference between the pre-test and post-test mean for the experiment group was 26.13 while the control group had a pre-test mean score 10.02 with a standard deviation of 2.743 and a post-test mean score of 17.27 with a standard deviation of 1.421 The difference between the

pre-test and post-test mean for the control group was 7.25 with a mean gain of 18.88 for experimental and control group. This shows that the mean score for the experimental group is higher than the control group, indicating that those taught electronic drawing with the sound amplification system project teaching aid performed better than those taught, using chalk board and demonstration method in Technical Colleges in Rivers State.

Research Question 2: What is the effect of sound amplification system project on students' academic



achievement in Radio and Electronic Systems in technical colleges in Rivers state?

Table 2: Mean and Standard Deviation achievement Scores of Students Taught with sound amplification system project and Students Taught using Demonstration Method

Group	School	N	Pretest $\bar{x}$	Post-test SD $\bar{x}$	Mean-diff SD	Mean-Gain
Experimental	GTC Ahoada	44	10.50	2.957	37.48	3.914
Control	GTC PH	46	9.89	2.608	17.18	1.244
						26.98
						7.29
						19.69

Table 2 shows the pre-test and post-test mean score of students' achievements in Radio and Electronic Systems for both experimental and control groups. Result shows that the students in the experimental group had a pre-test mean score of 10.50 with a standard deviation of 2.957 and a post-test mean score of 37.48 with a standard deviation of 26.98 The difference between the pre-test and post-test mean for the experiment group was 26.98 while the control group had a pre-test mean score 9.89 with a standard deviation of 2.608 and a post-test mean score of 17.18 with a standard deviation of 1.244 The difference between the pre-test and post-test mean for the control group was 7.29

with a mean gain of 19.69 for experimental and control group. This shows that the mean score for the experimental group was higher than the control group, indicating that those taught with the sound amplification system project teaching aid performed better than those taught, using chalk board and demonstration method in Technical Colleges in Rivers State.

Research Question 3: What is the effect of sound amplification system project on students' academic achievement in Radio and audio frequency amplifiers designs in technical colleges in Rivers state?

Table 3: Mean and Standard Deviation achievement Scores of Students Taught with sound amplification system project and Students Taught using demonstration method

Group	School	N	Pre-test $\bar{x}$	Post-test SD $\bar{x}$	Mean-diff SD	Mean-Gain
Experimental	GTC Ahoada	44	10.29	2.625	37.73	4.755
Control	GTC PH	46	9.57	2.574	17.55	1.337
						27.44
						7.98
						19.46

Table 3 shows the pre-test and post-test mean score of students' achievements in Radio and audio frequency

amplifiers designs for both experimental and control groups. Result shows that the students in the experimental



group had a pre-test mean score of 10.29 with a standard deviation of 2.625 and a post-test mean score of 37.73 with a standard deviation of 4.755. The difference between the pre-test and post-test mean for the experiment group was 27.44 while the control group had a pre-test mean score 9.57 with a standard deviation of 2.574 and a post-test mean score of 17.55 with a standard deviation of 1.337. The difference between the pre-test and post-test mean for the control group was 7.25 with a mean gain of 19.46 for experimental and control group. This shows that the mean score for the experimental group was higher than the

control group, indicating that those taught with the sound amplification system project teaching aid performed better than those taught, using chalk board and demonstration method in Technical Colleges in Rivers State.

Data Analysis

H₀₁: There is no significant difference between the achievements mean scores of students taught electronic drawing using sound amplification system project and those taught electronic drawing using chalk board and demonstration method in Technical Colleges in Rivers State.

Table 6: The Analysis of Covariance (ANCOVA) Table Showing Difference Between Students Taught with sound amplification system project and those Taught with Chalk board and demonstration method

Source	Type III Sum of Squares	Df	Mean Square	F-calc	Sig.
Corrected Model	9507.069 ^a	2	4753.535	1119.984	.000
Intercept	3295.445	1	3295.445	776.442	.000
Pretest	.125	1	.125	.029	.864
Group	8507.333	1	8507.333	2004.420	.000
Error	369.253	87	4.244		
Total	78159.000	90			
Corrected Total	9876.322	89			

Sig. fig. $\alpha \leq 0.05$

The analysis of covariance of students' achievement scores presented in table 4 showed that f-calculated for teaching aids in the two groups was 2004.420 at 0.000 significant level. It therefore implies that the hypothesis was rejected against the alternate hypothesis. Thus, there was a significance difference between the achievements mean scores of students taught electronic drawing using sound amplification system project and those taught electronic drawing using chalk board and demonstration method in Technical Colleges in Rivers State. In other words, Students taught electronic drawing with the sound

amplification system project teaching aid performed better than those taught with chalk board and demonstration method.

Hypothesis 2

H₀₂: There is no significant difference between the achievements mean scores of students taught Radio and Electronic Systems using sound amplification system project and those taught Radio and Electronic Systems using chalk board and demonstration method in Technical Colleges in Rivers State.

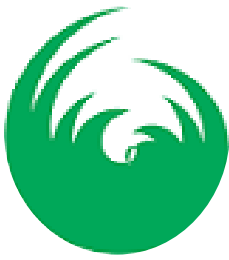


Table 5: The Analysis of Covariance (ANCOVA) Table Showing Difference Between Students Taught with sound amplification system project and those Taught with chalk board and demonstration method .

Source	Type III Sum of Squares	Df	Mean Square	F-calc	Sig.
Corrected Model	9264.314 ^a	2	4632.157	533.131	.000
Intercept	4549.533	1	4549.533	523.621	.000
Pretest	.116	1	.116	.013	.908
Group	9144.036	1	9144.036	1052.418	.000
Error	755.908	87	8.689		
Total	78358.000	90			
Corrected Total	10020.222	89			

Sig. fig. $\alpha \leq 0.05$

The analysis of covariance of students' achievement scores presented in table 5 showed that f-calculated for teaching aids in the two groups was 1052.418 at 0.000 significant level. It therefore implies that the hypothesis was rejected against the alternate hypothesis. Thus, there was a significant difference between the achievements mean scores of students taught radio and electronic systems using sound amplification system project and those taught radio and electronic systems using chalk board and demonstration method in Technical Colleges in Rivers State. Hence, the students taught radio and electronic systems with the sound amplification system project

performed better than those taught with chalk board and demonstration method.

Hypothesis 3

HO₃: There is no significant difference between the achievements mean scores of students taught Radio and audio frequency amplifiers designs using sound amplification system project and those taught Radio and audio frequency amplifiers designs using chalk board and demonstration method in Technical Colleges in Rivers State



Table 6: The Analysis of Covariance (ANCOVA) Table Showing Difference Between Students Taught with Sound Amplification System Project and those Taught with Chalk board and Demonstration Method

Source	Type III Sum of Squares	Df	Mean Square	F-calc	Sig.
Corrected Model	9264.314 ^a	2	4632.157	533.131	.000
Intercept	4549.533	1	4549.533	523.621	.000
Pretest	.116	1	.116	.013	.908
Group	9144.036	1	9144.036	1052.418	.000
Error	755.908	87	8.689		
Total	78358.000	90			
Corrected Total	10020.222	89			

Sig. fig. $\alpha \leq 0.005$

The analysis of covariance of students' achievement scores presented in table 6 showed that f-calculated for teaching aids in the two groups was 1052.418 at 0.000 significant level. It therefore implies that the hypothesis was rejected against the alternate hypothesis. Thus, there was a significant difference between the achievements mean scores of students taught Radio and audio frequency amplifiers designs using sound amplification system project and those taught Radio and audio frequency amplifiers designs using chalk board and demonstration method in Technical Colleges in Rivers State respectively. Hence, the students taught Radio and audio frequency amplifiers designs with sound amplification system project performed better than those taught with chalk board and demonstration method.

Findings of the Study

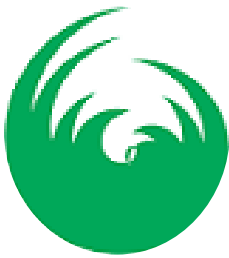
- Research question one revealed that the students taught Radio and audio frequency amplifiers designs with sound amplification system project performed better than those taught with chalk board and demonstration method
- Research question two revealed that the students taught radio and electronic systems with the sound

amplification system project performed better than those taught with chalk board and demonstration method

- Research question three revealed that the students taught electronic drawing with the sound amplification system project teaching aid performed better than those taught with chalk board and demonstration method

Discussion Findings of the Study

Table 1 shows the pre-test and post-test mean score of students 'achievement in electronic drawing for both experimental and control groups. Result shows that the students in the experimental group had a pre-test mean score of 11.69 with a standard deviation of 2.204 and a post-test mean score of 37.82 with a standard deviation of 34.82 The difference between the pre-test and post-test mean for the experiment group was 26.13 while the control group had a pre-test mean score 10.02 with a standard deviation of 2.743 and a post-test mean score of 17.27 with a standard deviation of 1.421 The difference between the pre-test and post-test mean for the control group was 7.25 with a mean gain of 18.88 for experimental and control group. This shows that the mean score for the experimental



group is higher than the control group, indicating that those taught electronic drawing with the sound amplification system project teaching aid performed better than those taught, using chalk board and demonstration method in Technical Colleges in Rivers State. While The analysis of covariance of students' achievement scores presented in table 4 showed that f-calculated for teaching aids in the two groups was 2004.420 at 0.000 significant level. It therefore implies that the hypothesis was rejected against the alternate hypothesis. Thus, there was a significance difference between the achievements mean scores of students taught electronic drawing using sound amplification system project and those taught electronic drawing using chalk board and demonstration method in Technical Colleges in Rivers State. In other words, Students taught electronic drawing with the sound amplification system project teaching aid performed better than those taught with chalk board and demonstration method. The findings of the study are in agreement with Abubaka (2014) who revealed that there is no significant difference in the academic performance of students in the school taught with instructional materials and those taught without instructional materials.

Table 2 shows the pre-test and post-test mean score of students' achievements in Radio and Electronic Systems for both experimental and control groups. Result shows that the students in the experimental group had a pre-test mean score of 10.50 with a standard deviation of 2.957 and a post-test mean score of 37.48 with a standard deviation of 26.98. The difference between the pre-test and post-test mean for the experiment group was 26.98 while the control group had a pre-test mean score of 9.89 with a standard deviation of 2.608 and a post-test mean score of 17.18 with a standard deviation of 1.244. The difference between the pre-test and post-test mean for the control group was 7.29 with a mean gain of 19.69 for experimental and control group. This shows that the mean score for the experimental group was higher than the control group, indicating that those taught with the sound amplification system project

teaching aid performed better than those taught, using chalk board and demonstration method in Technical Colleges in Rivers State. While The analysis of covariance of students' achievement scores presented in table 5 showed that f-calculated for teaching aids in the two groups was 1052.418 at 0.000 significant level. It therefore implies that the hypothesis was rejected against the alternate hypothesis. Thus, there was a significant difference between the achievements mean scores of students taught radio and electronic systems using sound amplification system project and those taught radio and electronic systems using chalk board and demonstration method in Technical Colleges in Rivers State. Hence, the students taught radio and electronic systems with the sound amplification system project performed better than those taught with chalk board and demonstration method. The finding confirms the assertion of Abdu-Raheem (2016), which says that Instructional materials makes learning more realistic, practical and appealing.

Table 3 shows the pre-test and post-test mean score of students' achievements in Radio and audio frequency amplifiers designs for both experimental and control groups. Result shows that the students in the experimental group had a pre-test mean score of 10.29 with a standard deviation of 2.625 and a post-test mean score of 37.73 with a standard deviation of 4.755. The difference between the pre-test and post-test mean for the experiment group was 27.44 while the control group had a pre-test mean score of 9.57 with a standard deviation of 2.574 and a post-test mean score of 17.55 with a standard deviation of 1.337. The difference between the pre-test and post-test mean for the control group was 7.25 with a mean gain of 19.46 for experimental and control group. This shows that the mean score for the experimental group was higher than the control group, indicating that those taught with the sound amplification system project teaching aid performed better than those taught, using chalk board and demonstration method in Technical Colleges in Rivers State. The analysis of covariance of students' achievement scores presented in



table 6 showed that f-calculated for teaching aids in the two groups was 1052.418 at 0.000 significant level. It therefore implies that the hypothesis was rejected against the alternate hypothesis. Thus, there was a significant difference between the achievements mean scores of students taught Radio and audio frequency amplifiers designs using sound amplification system project and those taught Radio and audio frequency amplifiers designs using chalk board and demonstration method in Technical Colleges in Rivers State respectively. Hence, the students taught Radio and audio frequency amplifiers designs with sound amplification system project performed better than those taught with chalk board and demonstration method. The finding of the study was in harmony with Obodo, Ani & Mfon, (2020) who agreed that students taught using improvised teaching-learning materials performed better than students taught without improvised teaching-learning materials.

Conclusion

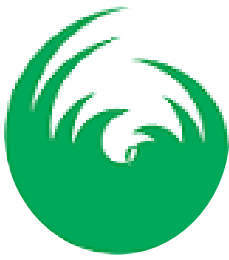
The purpose of this study was to determine the effect of sound amplification system project on students' academic achievement in radio, television and electronics works in technical colleges in Rivers state. the researcher picked the topics from the NTC 11 radio television and electronics works syllabus which needed to be taught with sound amplification system project. Prior to the teaching, radio, television and electronics works teachers from the two technical colleges used in this study was taught on how to use sound amplification system project. The teachers of, radio, television and electronics works in the two technical colleges taught, radio, television and electronics works students with the sound amplification system project and discovered that in each topic taught electrical/electronic drawing, Radio and Electronic Systems and Radio and audio frequency amplifiers designs using sound amplification system project performed more better than those taught using chalk board and demonstration method in Technical Colleges in Rivers State

Recommendation

1. Technical College administrators should provide fund to procure the materials and component for designing sound amplification system project in the Technical Colleges in Rivers State.
2. Project-based teaching methods should be used for teaching of radio, television and electronics works in technical colleges in Rivers state
3. Trainings and workshops should be organized by the government for all teachers in technical colleges to acquaint them on how to improvise equipment for proper training of the students.

Reference

- Abdu-Raheem (2016). Effects of Instructional Materials on Secondary Schools Students' Academic Achievement in Social Studies in Ekiti State, *Nigeria World Journal of Education* 6(1)
- Abrahams, I. & Reiss, M. J. (2015). The assessment of practical skills. *School Science Review*, 96(357), 40-44.
- Aina, J.K. 2011. Relationship between students' academic performance in theory and practical physics in colleges of education in kwara state, Nigeria. [Unpublished master's thesis], University of Ilorin, Nigeria
- Education Queensland. (2000). *Using sound field amplification systems (SAS) in the classroom*. Queensland: QGPS.
- Eze, H.I. Ogbuene, E.B and Nwachukwu U. L. (2013), The Application of Landscaping Approach in Environmental Management of Roads in Enugu, *Sacha Journal of Environmental Studies, England London*, 3 (1), 59 - 64,
- Federal Republic of Nigeria (2004). *National Policy on Education*. Lagos: NERC.



Federal Republic of Nigeria (2014), *National Policy on Education*. NERDC Press

Harackiewicz, J.M., & Hulleman, C. S. (2010). The importance of interest: The role of achievement goals and task values in promoting the development of interest. *Social and Personality Psychology Compass*, 4(1), 42-52.

National Board for Technical Education (2010). *National technical certificate examination syllabus for engineering trades based on the NBTE modular curricular*. NBTE.

Obodo, A. C., Ani. M. I. & Mfon, E. T. (2020). Effects of improvised teaching-learning materials on the academic performance of junior secondary school students in basic science in Enugu

State, Nigeria. *Journal of Research & Method in Education*, 10(4), 23-30.

Roberts Y. & Chen S (2015) Perceived accessibility, mobility, and connectivity of public transportation systems. *Transportation Research Part A Policy and Practice* 77(2)

Uwalaka, A. J.; Offorma, G. C. (2015). Effect of constructivist teaching method on students' achievement in french listening comprehension in Owerri North LGA of Imo State, Nigeria. *Journal of Education and Practice*, 6 (26) 52-56

Wheeler A (2014). “The sustainable school: Effective and energy efficient ventilation in the classroom, and the question of educational performance and wellbeing” World Sustainable Building Conference, 28th – 29th October, Barcelona.