

Impact of Information and Communication Technology in the Teaching of Electrical Installation and Maintenance Work in Technical Colleges in Rivers State, Nigeria

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Abstract

This study examined the impact of Information and Communication Technology in teaching electrical installation and maintenance work in technical college in Rivers State. Specifically, this work sought to identify the Information and Communication Technology utilized in teaching electrical installation and maintenance work in technical colleges in Rivers State and the instructional and managerial impacts of Information and Communication Technology in teaching electrical installation and maintenance work in technical colleges in Rivers State. Three research questions and hypotheses were answered and tested at .05 level of significance. A descriptive survey design guided the study. The population of the study comprised all the electrical installation and maintenance work teacher and National Technical Certificate (NTC) II students in technical colleges in Rivers State. As at the time of the study, there was an estimated population of 20 and 164 electrical installation and maintenance work teachers and NTC II students respectively. The population was manageable; therefore, the entire population was used for the study. Self-made survey questionnaire titled "Impact of Information and Communication Technology in Teaching Electrical Installation and Maintenance Work". The instrument was face validated by three experts in the department of vocational technology education in Rivers State University. The reliability of the instrument was established using Cronbach Alpha reliability coefficient which yielded a coefficient of .72. Mean and Standard Deviation were used to answer the research questions while z-test statistical tool was used to test the hypotheses. The study found among others that Information and Communication Technology builds student interest to learn, makes the sourcing of information easier for teachers and students, ensures better understanding of concepts, makes it easier for students to learn from other experts, facilitates remembering of concepts, motivates students to study, and captivates students attention, helps teacher in planning lessons, makes evaluation process easier for teacher and helps teacher to identify individual differences. Therefore, it was recommended that among others that Governments should ensure that Information and Communication Technologies are provided and utilized in technical colleges.

Keywords: Electrical Installation and Maintenance Work, Impact, Information and Communication Technology, Technical College

INTRODUCTION

Education is a veritable tool that is used in the development of countries social, political, technological and economic endeavours. Oluwalola (2019) opined that education is the process

whereby the organized knowledge of the past generation is made available for the current or newer generation. The general purpose of education is to equip an individual with the relevant skill required of the students to survive in the wider world. Thus, several educational programmes have been introduced to provide manpower in different fields. For instance, technical programmes have been designed to be taught in technical colleges. Technical college could be described as secondary institutions whereby persons are trained to acquire skills knowledge and attitude required for self or paid employment. Similarly, Ochogba and Ordu (2019) described technical college as an institution that trains individuals with vocational skills that are relevant for employment, self-employment or for admission into tertiary institutions.

However, technical colleges are saddled with the responsibility of training people to become craftsmen and women who are qualified for jobs in both public and private sectors of the economy. To achieve this, Joseph, et al (2018) opine that technical colleges train craftsmen and master craftsmen in building construction, radio television and electronic works, electrical installation, auto mechanics, plumbing and pipe fitting, carpentry and joinery, painting and decorating, welding and fabrication, cabinet making amongst others. Electrical Installation and Maintenance Works (EIMW) Programme is one of the TVE programmes which, according to the curriculum of the programme (National Board for Technical Education, NBTE, 2003) provides training that leads to the production of skilled personnel like craftsmen and technicians who could either secure employment at the end of their training, set up their own businesses or further their studies in Polytechnics, Colleges of Education (Technical) and Universities (Manabete & Makinde, 2016). The curriculum of the Electrical Installation and Maintenance Works programme covers a period of three years. Electrical and installation and maintenance work enables students to demonstrate various experiments involving resistors, capacitors and inductors (Series/parallel connection), undertake both domestic and industrial installation, install electrical machines, prepare and join electrical cables, install/connect batteries for charging systems, use tools to dismantle, recoil and recouple an electrical machine (generator or motor) and undertake tests on installations and machines using appropriate tools (NBTE, 2003).

However, in this period of economic meltdown, electrical installation and maintenance work can be considered as one of the fundamental ways for getting a success in life and to fit in the labour markets. It is also seen as a way of equipping youth with necessary skills for them to stand on their own and not rely totally on white collar jobs. Therefore, teaching electrical installation and maintenance work at the technical colleges should be very effective to help achieve the aim of introducing the subject. According to Oyediran and Dick (2018), effective

teaching could be facilitated through advances in computer and telecommunication technology, in addition to the ever-evolving worldwide web, which has become a major force to reckon with in searching for and dissemination of information. Ajayi (2008) opined that teaching and learning of electrical installation and maintenance work had gone beyond the teacher standing in front of a group of pupils and disseminating information to them without the students' adequate participation.

Thus, Information and Communication Technology (ICT) could facilitate the teaching of electrical installation and maintenance work in technical colleges. ICT has become key tools and had a revolution effect on how we live and see the world. It is making dynamic changes in society (Jo, 2013). Ofodu, (2007) described ICT as electronic or computerized devices assisted by human and interactive materials that can be used for a wide range of teaching and learning as well as for personal use. ICT could also be described as processing and sharing of information using all kinds of electronic devices an umbrella that includes all technologies for manipulation of communication and information (Ajani, 2016). There are different ICTs that are used in today's education such as computers, the Internet, and electronic delivery systems such as radios, televisions, and projectors among others (Jo, 2013). The use of these ICTs has tremendously transformed the educational system. ICTs provide both students and teachers with more opportunities in adapting learning and teaching to individuals need; society is forcing schools aptly to respond to this technical innovation.

The adoption of ICT by the teachers will ensure good course organization, effective classroom management, content creation, self-assessment, self-study collaborative learning, task-oriented activities and effective communication between the acts of teaching, leaning process and research activities (Jo, 2013). Ajayi (2008) stated that with the aid of ICT, teachers can take students beyond traditional limits, ensure their adequate participation in teaching and learning process and create vital environments to experiment and explore this new development is a strong indication that the era of teaching without ICT skills are gone. Any classroom teacher with adequate and professional skills in ICT utilization will definitely have his students perform better in classroom learning provided that there are no external factors (Adiela & Ochogba, 2020).

Ajayi (2008) further explained that the use of ICT facilities involves various methods which include systematized feedback, computer-based operation/network, audio-conferencing, video conferencing, internet/worldwide website and computer assisted instruction. It must however be stressed that the effective use of the various methods of the ICT in teaching and learning has great impact in teaching. Teleconferencing classrooms allow both learner and teacher to

interact simultaneously with ease and convenience (Jo, 2013). ICT therefore has several impacts in teaching and learning. Hence, this study will examine the impact of ICT in the teaching of electrical installation and maintenance works in technical colleges in Rivers State.

Statement of the Problem

Teaching contributes immensely towards the transfer of culture, skills, knowledge and attitude from one generation to another. Through this means norms and values of a people could be sustained. This is why countries are investing hugely towards building a robust educational system so as to ensure effective teaching. Hence, teaching is done with modern facilities against the conventional means that involved the basic use of chalkboard and chalk. Today, classrooms are becoming sophisticated with ICTs and it is believed that students taught in such classrooms perform better than those taught in a conventional classroom. The adoption of ICT in schools today is so significant that some parents prefer to admit their wards in schools that have ICT facilities. According to research conducted by Ochogba (2021), it was found that motor vehicle mechanics students taught with computer animation strategy performed better than those taught with demonstration strategy. Therefore, the use of ICTs could have great impact in teaching. The question is, what impact do ICTs have in teaching? It is against this backdrop that the researcher deemed it fit to carry out research to investigate the impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State.

Purpose of the Study

The study examined the impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State. Specifically, the study sought to:

1. Identify the ICTs utilized in teaching electrical installation and maintenance works in technical colleges in Rivers State.
2. Ascertain the instructional impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State.
3. Determine the managerial impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State.

Research Questions

Three research questions were answered to guide the study.

1. What are the ICTs utilized in teaching electrical installation and maintenance works in technical colleges in Rivers State?
2. What is the instructional impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State?

3. What is the managerial impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State?

Hypotheses

The following null hypotheses were formulated and tested for this study at 0.05 significant level.

1. There is no significant difference between the mean responses of teachers and students on the ICTs utilized in teaching electrical installation and maintenance works in technical colleges in Rivers State.
2. There is no significant difference between the mean responses of teachers and students on the instructional impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State.
3. There is no significant difference between the mean responses of teachers and students on the managerial impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State.

METHODOLOGY

Descriptive survey design was used for the study. The study was carried out in Rivers State. The population of the study comprised all the electrical installation and maintenance work teacher and National Technical Certificate (NTC) II students in technical colleges in Rivers State. The choice of NTC II is based on the fact that NTC II students have spent at least a year in the program and they are not certificate class hence the researcher believe that they could be able to give more information related to this study than any other set of students. As at the time of the study, there was an estimated population of 20 and 164 electrical installation and maintenance work teachers and NTC II students respectively. The population was manageable; therefore, the entire population was used for the study. Self-made survey questionnaire titled "Impact of Information and Communication Technology in Teaching Electrical Installation and Maintenance Work" (IICTTEIMW) served as the instrument for data collection. It was used to assess the impact of ICT in the teaching of electrical installation and maintenance work in technical colleges in Rivers State. The instrument was partitioned into three sections that were structured in the pattern of Likert 5-point rating scale of Strongly Agree (SA-5), Agree (A-4), Undecided (U-3), Disagree (D-2) and Strongly Disagree (SD-1). The instrument was face validated by two experts in the Department of Vocational Technology Education in Rivers State University. Also, the instrument was tested to ascertain its reliability using Cronbach Alpha Reliability Coefficient tool. This was achieved through purposive sampling of 4 technical teachers and 8 NTC II students in technical college in Bayelsa. The reliability

coefficient achieved was .72 which confirmed the reliability of the instrument. Copies of the instruments were administered and retrieved by the researcher at the spot of administration. Mean and Standard deviation were used to answer the research questions and to ascertain the homogeneity of responses. Also, z-test statistical tool was used to test the hypotheses. Mean scores less than 3.00 were rejected while Mean scores equal or greater than 3.00 were accepted. Also, z-calculated values less than z-critical values were accepted while z-calculated values greater than z-critical values were rejected which shows that there was a significant difference between the mean responses of the groups.

RESULTS

The results from the study were presented as follows.

Research Question 1: What are the ICTs utilized in teaching electrical installation and maintenance works in technical colleges in Rivers State?

Table 1: Mean Responses on ICTs Utilized in Teaching Electrical Installation and Maintenance Works.

S/N	ICTs Utilized in the Teaching of EIMW	Teacher (N ₁ =20)			NTC II Students (N ₂ =164)		
		$\bar{X}$	SD	RMK	$\bar{X}$	SD	RMK
1	Projector	3.65	1.57	Agree	3.95	1.50	Agree
2	Laptop	4.20	1.15	Agree	3.98	1.49	Agree
3	Interactive Board	4.30	.92	Agree	3.90	1.53	Agree
4	Television	4.30	.92	Agree	3.94	1.49	Agree
5	Radio	4.45	.76	Agree	3.96	1.49	Agree
6	Recorder	4.25	1.07	Agree	3.95	1.50	Agree
7	Smart phone	4.20	1.24	Agree	3.91	1.56	Agree
8	Pointer	4.00	1.49	Agree	3.92	1.55	Agree
9	Software	3.95	1.50	Agree	3.95	1.52	Agree
10	Desktop	3.80	1.61	Agree	3.96	1.58	Agree
	Total	4.11	1.22	Agree	3.94	1.52	Agree

Source: *Researcher's Field Result; 2021* A - - Agree, D - - Disagree

Result in Table 1 shows that both teachers and NTC II students in technical colleges in Rivers State agreed that all the variables highlighted are the ICTs utilized in the teaching of EIMW in technical colleges in Rivers State. This is evident in the Grand Mean scores of 4.11 for teachers and 3.94 for NTC II students, which are both greater than 3.00 which is the acceptable mean value. Also, the closeness in the Standard Deviation for both groups which is 1.22 and 1.52 shows homogeneity in the responses of both groups. This is in consonance with Jo (2013) that opined that there are several ICTs used in education such as computers, the internet, and electronic delivery systems such as radios, televisions, and projectors among others.

Research Question 2: What is the instructional impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State?

Table 2: Mean Responses on the Instructional Impacts of ICTs in Teaching Electrical Installation and Maintenance Work.

S/N	Instructional Impacts of ICTs in Teaching EIMW	Teacher (N ₁ =20)			NTC II Students (N ₂ =164)		
		$\bar{X}$	SD	RMK	$\bar{X}$	SD	RMK
11	Builds student interest to learn	3.25	1.55	Agree	3.66	1.56	Agree
12	Makes it easier for teacher to display equipments and appliances to students	3.50	1.43	Agree	3.69	1.56	Agree
13	Makes the sourcing of information easier for teachers and students	3.30	1.34	Agree	3.71	1.55	Agree
14	Ensures better understanding EIMW	3.30	1.34	Agree	3.69	1.57	Agree
15	Makes it easier for students to learn from other experts	3.40	1.31	Agree	3.74	1.53	Agree
16	Facilitates remembering of concepts	3.35	1.39	Agree	3.75	1.54	Agree
17	Motivates students to study	3.40	1.47	Agree	3.62	1.60	Agree
18	Helps teacher to improve in instruction delivery	3.65	1.42	Agree	3.61	1.61	Agree
19	Makes students to study more	3.45	1.50	Agree	3.67	1.56	Agree
Total		3.40	1.42	Agree	3.68	1.56	Agree

Source: Researcher's Field Result; 2021 A - - Agree; D - - Disagree

Result in Table 2 shows that both teachers and NTC II students in technical colleges in Rivers State agreed that all the variables highlighted are the instructional impacts of ICTs in teaching EIMW in technical colleges in Rivers State. This is evident in the Grand Mean scores of 3.40 for teachers and 3.68 for NTC II students, which are both greater than 3.00 which is the acceptable mean value. Also, the closeness in the Standard Deviation for both groups which is 1.42 and 1.56 shows homogeneity in the responses of both groups. This is in conformity with previous studies. Ajayi (2008) stated that with the aid of ICT, teachers can take students beyond traditional limits, ensure their adequate participation in teaching and learning process and create vital environments to experiment and explore this new development is a strong indication that the era of teaching without ICT skills are gone. Also, Adiela and Ochogba (2020) opined that any classroom teacher with adequate and professional skills in ICT utilization will definitely have his students perform better in classroom learning provided that there are no external factors.

Research Question 3: What are the managerial impacts of ICTs in teaching electrical installation and maintenance works in technical colleges in Rivers State?

Table 3: Mean Response of Respondents on Peer Group factors that affect the Perception of Female Participation in TVET Programme in Rivers State universities.

S/N	Instructional Impacts of ICTs in Teaching EIMW	Teacher (N ₁ =20)			NTC II Students (N ₂ =164)		
		$\bar{X}$	SD	RMK	$\bar{X}$	SD	RMK
20	Helps teacher in storing students' academic records	3.40	1.43	Agree	3.69	1.44	Agree
21	Helps teacher in planning lessons	3.40	1.43	Agree	3.77	1.43	Agree
22	Helps teacher in organizing the classroom	3.55	1.43	Agree	3.66	1.50	Agree
23	Helps teacher to identify individual differences	3.25	1.45	Agree	3.74	1.43	Agree
24	Makes the production of instructional materials easier	3.75	1.48	Agree	3.74	1.46	Agree
25	Helps teacher in time management	3.60	1.51	Agree	3.76	1.44	Agree
	Total	3.49	1.46	Agree	3.73	1.45	Agree

Source: *Researcher's Field Result; 2021* A - - Agree; D - - Disagree

Result in Table 3 shows that both teachers and NTC II students in technical colleges in Rivers State agreed that all the variables highlighted are the managerial impacts of ICTs in teaching EIMW in technical colleges in Rivers State. This is evident in the Grand Mean scores of 3.49 for teachers and 3.73 for NTC II students, which are both greater than 3.00 which is the acceptable mean value. Also, the closeness in the Standard Deviation for both groups which is 1.46 and 1.45 shows homogeneity in the responses of both groups. This is in line with Jo (2013) that aver that the adoption of ICT by the teachers will ensure good course organization, effective classroom management, content creation, self-assessment, self-study collaborative learning, task-oriented activities and effective communication between the acts of teaching, leaning process and research activities.

Statistical Test of Hypotheses

The following null hypotheses were formulated and tested for this study at 0.05 significant level.

Hypothesis 1

There is no significant difference between the mean responses of teachers and students on the ICTs utilized in teaching electrical installation and maintenance works in technical colleges in Rivers State.

Table 4: z-Test for Responses on the ICTs Utilized in Teaching EIMW

S/N	$\bar{X}$	SD	N	df	α	zcal	zcrit	Remark
Teachers	4.11	1.22	20	182	0.05	0.57	1.96	Accepted
NTC II Students	3.94	1.52	164					

Source: *Researcher's Field Result; 2021* Accept Ho if tcal $\leq$ tcrit, Otherwise Reject Ho.

Table 4 shows that teachers Mean and Standard Deviation scores were 4.11 and 1.22 respectively, while NTC II Students Mean and Standard Deviation scores were 3.94 and 1.52 respectively. The z-cal value was .57, while the z-crit was 1.96 at a .05 level of significance. This result shows that z-cal was less than z-crit, which means that the null hypothesis was accepted. Therefore, there was no significant difference between the mean responses of teachers and students on the ICTs utilized in teaching electrical installation and maintenance works in technical colleges in Rivers State.

Hypothesis 2

There is no significant difference between the mean responses of teachers and students on the instructional impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State.

Table 5: z-Test for Responses on the Instructional Impact of ICTs in Teaching EIMW

S/N	$\bar{X}$	SD	N	df	α	zcal	zcrit	Remark
Teachers	3.40	1.42	20	182	0.05	0.82	1.96	Accepted
NTC II Students	3.68	1.56	164					

Source: *Researcher's Field Result; 2021* Accept Ho if $zcal \leq zcrit$, Otherwise Reject Ho.

Table 5 shows that teachers Mean and Standard Deviation scores were 3.40 and 1.42 respectively, while NTC II Students Mean and Standard Deviation scores were 3.68 and 1.56 respectively. The z-cal value was .82, while the z-crit was 1.96 at a .05 level of significance. This result shows that z-cal was less than z-crit, which means that the null hypothesis was accepted. Therefore, there was no significant difference between the mean responses of teachers and students on the instructional impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State.

Hypothesis 3

There is no significant difference between the mean responses of teachers and students on the managerial impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State.

Table 6: z-Test for Responses on the Managerial Impact of ICTs in Teaching EIMW

S/N	$\bar{X}$	SD	N	df	α	zcal	zcrit	Remark
Teachers	3.49	1.46	20	182	0.05	0.69	1.96	Accepted
NTC II Students	3.73	1.45	164					

Source: *Researcher's Field Result; 2021* Accept Ho if $zcal \leq zcrit$, Otherwise Reject Ho.

Table 6 shows that teachers Mean and Standard Deviation scores were 3.49 and 1.46 respectively, while NTC II Students Mean and Standard Deviation scores were 3.73 and 1.45

respectively. The z-cal value was .69, while the z-crit was 1.96 at a .05 level of significance. This result shows that z-cal was less than z-crit, which means that the null hypothesis was accepted. Therefore, there was no significant difference between the mean responses of teachers and students on the managerial impact of ICT in teaching electrical installation and maintenance works in technical colleges in Rivers State.

Conclusion

Based on the findings of this study, it was deduced that different ICTs are utilized in teaching EIMW in technical colleges. Also, the study also deduced that ICTs builds student interest to learn, makes the sourcing of information easier for teachers and students, ensures better understanding of EIMW concepts, makes it easier for students to learn from other experts, facilitates remembering of concepts, motivates students to study, and captivates students' attention, helps teacher in planning lessons, makes evaluation process easier for teacher and helps teacher to identify individual differences, among others.

Recommendations

Based on the findings of this study, the following recommendations were made:

- 1 Governments should ensure that ICTs are provided in technical colleges so that teachers can use them to teach for effective understanding.
- 2 Teachers should always make use of ICTs during instructions since it ensures students better understanding of EIMW.
- 3 EIMW teachers should always make use of ICTs in preparing their lessons to make it easier and reliable.

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