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Level of Utilization and Ownership Types of Facilities for Teaching Electrical Installation and Maintenance Work in Technical Colleges in Lagos State

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Abstract: The study investigated levels of utilization and ownership types of Hardware and Software Information Technology (IT) facilities for teaching electrical installation and maintenance in Government Technical Colleges in Lagos State. Descriptive survey research design was adopted for the study. The populated consisted of all Electrical Installation and Maintenance Work teachers in Government Technical Colleges in Lagos State. Thirty (30) Electrical Installation and Maintenance Works teachers were purposively sampled for the study. Two specific objectives; two research questions and two hypotheses at $p < 0.05$ were formulated to guide the study. A self-constructed questionnaire titled: 'Hardware and Software Information Technology (IT) Facilities Observational Schedule (HSITFOS)' was presented to experts in Vocational and Technical Education Department for face and content validity. A pilot study was conducted to determine the reliability of the research instrument. Data from the pilot study were subjected to Kendall's Coefficient of concordance (W) analysis. Kendall's reliability coefficient of concordance (W) 0.85 on Hardware (IT) and 0.87 on Software IT facilities suggested internal consistency of instruments. The research instruments were administered to sampled respondents. Data were analyzed using mean, standard deviation, ratio, frequencies, percentage, and chi-square. The formulated hypotheses were tested using t-test statistic. The findings revealed that hardware facilities such as computer, digital multimetre and Rj 45 were utilized, while the other hardware IT facilities were rarely utilized across Government Technical Colleges in Lagos State. Software IT facilities were rarely utilized in Government Technical Colleges in Lagos State for teaching Electrical Installation and Maintenance Works.
The State and Federal Colleges now face the challenges of different levels of utilization of hardware and software facilities; poor funding; lack of awareness, skills and training; inconsistent government policies on IT; and epileptic electricity supply on ownership types of Hardware and Software Information Technology (IT) facilities for teaching electrical installation and maintenance in Government Technical Colleges in Lagos State.
It was recommended that government should provide Hardware and Software Information Technology facilities for effective teaching electrical installation and maintenance works in Technical Colleges.

Keywords: *Utilization, Ownership, Hardware, Software, Electrical Installation, Maintenance Work, Technical Colleges*

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I. Introduction

Levels of utilization of hard and soft IT facilities for teaching and learning Electrical Installation and Maintenance work in Technical and Vocational Education cannot be accessed as a whole but through the different methods of teaching IT components. The different of IT components include; the hardware, software, multimedia and internet facilities. Hardware facilities are computer, television, radio, oscilloscope, scanner, interactive board, projector, computer table/chair, satellite, CD-ROM, flash driver, public address system, smart phone, ups, flopper driver, printer, digital camera, joy stick, solider iron, digital multimedia, analogue multimedia, router/swites, crimping tools, Rj 45, cable (cat 3). Thomas *et al.*, (2013) reported the benefits of utilizing IT facilities in teaching students in Technical Colleges. These authors posit that the use of IT facilities assist learners to clarify difficult concepts and motivates both teachers and students saves both teachers and student time; make students active; and simplify teachers work. Laurillard (2013) observed that levels of utilization of IT facilities in Technical Colleges make students actively engaged in the learning process through simulation and discussion; and brings about greater IT infrastructure performance more highly than educational institutions with less developed IT infrastructure. In many schools in Nigeria, students are known to spend more time on automated machine in the workshop without covering practical aspect of syllabus of course (Abubakar, 2000). The levels of utilization of IT facilities in teaching and learning Electrical Installation and Maintenance

work in Technical and Vocational Schools play a vital role in achieving performance objectives of curriculum, and hence making transition from school to employment effective and efficient with little need for adjustment. The various ICT hardware facilities used in the teaching and learning process in Technical Colleges according to Ofodu (2007), Bamidele (2006), Bryers (2004) and Babajide and Bolaji (2003) are radio, television, computers, overhead projectors, optical fibres, fax machines, CD-Rom, internet, electronic notice board, slides, digital multimedia and video/VCD machine.

The National Policy on Education (FRN, 2004) emphasized the intention to computerize Nigerian educational system by charging all educational institutions to infuse computer literacy into educational programmes. The gradual modifications of curriculum place emphasis on the use of Computer Aid Instruction (CAI) as attractive instructional medium for skill training that could influence electrical installation and maintenance works. Many schools in Nigeria especially schools in the North-East are now integrating IT into teaching and learning processes which entails the use of computer and accessories. Many researchers (Refs.) reported that the use of IT facilities have numerous benefits to teachers and students. Federal Colleges and State Colleges made several trials towards implementation of integrating IT for teaching and learning process. Richardson (2012) asserted that the challenges toward successful IT integration in Colleges of Education included high cost of internet bandwidth; lack of technical IT expertise; and IT facilities. The State and Federal Colleges now face the challenges of different levels of utilization of hardware and software facilities; poor funding; lack of awareness, skills and training; inconsistent government policies on IT; and epileptic electricity supply (Apulu & Latham, 2009). In addition, Ajayi and Ekundayo (2009) noted other challenges like inadequate computer literate teachers; high cost of purchasing hardware, software, multimedia and internet computers for schools; inadequate facilities to support full application of the IT; irregular power supply: and poor funding of researches. Many Technical Colleges in Lagos State graduate students who are deficient in IT skills and cannot fit into the labour market. Most graduates from Technical Colleges do not meet up with the demands of the economy and labour market in the current technological era. Presently, graduates cannot compete favourably for global jobs due to insufficient IT knowledge and skills in hardware and software facilities. These graduates find it hard to get jobs or become self-employed trade skills. From the foregoing, this study investigates the levels of utilization of IT facilities for teaching of electrical installation and maintenance works in Technical Colleges in Lagos State.

Purpose of the Study

The study investigates Levels of Utilization and Ownership Types of Hardware and Software Information Technology Facilities for teaching Electrical Installation and Maintenance Work in Government Technical Colleges in Lagos State.

The specific objectives are to determine the:

1. levels of utilization of Hardware IT facilities for teaching Electrical Installation and Maintenance Works in Technical Colleges in Lagos State; and
2. levels of utilization of Software IT facilities for teaching Electrical Installation and Maintenance Works in Technical Colleges in Lagos State.

Research Questions

The following research questions were stated to guide this study:

1. What are the levels of utilization Hardware IT facilities for teaching Electrical Installation and Maintenance Works in Technical Colleges in Lagos State?
2. What are the levels of utilization Software IT facilities for teaching Electrical Installation and Maintenance Works in Technical Colleges in Lagos State?

Research Hypotheses

The following hypotheses were stated and tested at $P < 0.05$ level of significance:

HO_1: The level of utilization of Hardware IT facilities for teaching Electrical Installation and Maintenance Works in Technical Colleges in Lagos State does not depend on school ownership

HO_2: The level of utilization Software IT Software facilities for teaching Electrical Installation and Maintenance Works in Technical Colleges in Lagos State does not depend significantly on school ownership.

II. Methodology

Descriptive survey design was adopted for the study. Thirty (30) Electrical Installation and Maintenance Works teachers were sample out of the totally population of Eighty-five (85) from Government Technical Colleges in Lagos State; which included Government Technical College, Adosoba; Government Technical College, Agidingbi, Ikeja; Government Technical College, Epe; Government Technical College, Ikorodu; Government

Technical College, Ikotun and Federal Science and Technical College (FSTC) Yaba, Lagos, using purposive sampling techniques. A self-constructed questionnaire titled 'Hardware and Software Information Technology (IT) Facilities Observational Schedule (HSITFOS)' based on the topics under electrical installation and maintenance works according to National Board for Technical Examination (NBTE) curriculum was adopted and used for the study. The instrument consisted of two sections; A and B. Section A focused on the personal Bio-data of teachers while section B focused on Hardware and Software IT facility observational schedule which had two sub-sections on twenty-six (26) items addressing level of utilization of Hardware and 18 Software in electrical installation and maintenance works. The research instrument was given face and content validity by experts in the Department of Technology and Vocational Education. The validated instrument was trial-tested in a pilot study using 30 teachers in Federal Science and Technical College in Ijebu- Mushin in Ogun State. Data from pilot study was analyzed using Kendal of Concordance (W) statics. The reliability coefficient (W) 0.78 and 0.75 were obtained for Hardware and Software question items respectively indicating internal consistencies of items tested. All corrections and suggestions were infused into the research instrument before used in the main study. The researcher and 6 trained Research Assistants administer the research instrument to respondents and ensured 100% collection of the instrument. Data were analyzed using mean and standard deviation, while hypotheses tested by Chi-square statistics at $p < 0.05$, using of Statistical Package for Social Science (SPSS) Statistics (version 23).

III. **Results Presentation**

Research Question One

What is the level of utilization of hardware facilities for teaching electrical installation and maintenance works in Federal and State Technical Colleges in Lagos State?

Table 1 shows the result of the level of utilization of hardware facilities for teaching electrical installation and maintenance works in **Federal and State** Technical Colleges in Lagos State

Table1: Level of utilization of hardware facilities for teaching electrical installation and maintenance works in Federal and State Government Technical Colleges in Lagos State.

S/N	ICT Equipment	School Ownership	Mean	SD	Decision
1	Computer	State	4.00	0.38	Utilized
		Federal	3.80		Utilized
2	Television	State	3.75	0.31	Utilized
		Federal	3.85		Utilized
3	Radio	State	3.75	0.41	Utilized
		Federal	3.80		Utilized
4	Oscilloscope	State	2.25	0.48	Rarely Utilized
		Federal	2.35		Rarely Utilized
5.	Scanner	State	2.25	0.44	Rarely Utilized
		Federal	2.25		Rarely Utilized
6.	Interactive board	State	2.00	0.59	Rarely Utilized
		Federal	1.35		Rarely Utilized
7.	Projector	State	1.25	0.50	Rarely Utilized
		Federal	1.45		Rarely Utilized
8.	Computer table/chair	State	3.25	0.34	Utilized
		Federal	3.10		Utilized
9.	Satellite	State	0.75	0.34	Rarely Utilized
		Federal	0.90		Rarely Utilized
10.	CD- ROM	State	2.75	0.48	Utilized
		Federal	2.65		Utilized
11	Flash driver	State	3.25	0.59	Utilized
		Federal	2.70		Utilized
12.	Public address system	State	3.00	0.20	Utilized
		Federal	2.95		Utilized
13	Smart phone	State	2.45	0.51	Rarely Utilized
		Federal	2.75		Utilized
14	UPS	State	2.75	0.80	Utilized
		Federal	3.50		Utilized
15	Flopper driver	State	1.65	0.50	Rarely Utilized
		Federal	1.25		Rarely Utilized
16	Hp laserjet 1200 Printer	State	1.50	0.64	Rarely Utilized
		Federal	2.50		Utilized
17	Desk jet 6200 Printer	State	1.30	0.59	Rarely Utilized
		Federal	0.75		Rarely Utilized
18	LCD Projector	State	1.95	0.36	Rarely Utilized
		Federal	2.00		Rarely Utilized
19	Digital camera	State	3.85	0.58	Utilized

		Federal	3.75		Utilized
20	Solider iron	State	3.15	0.58	Utilized
		Federal	3.25		Utilized
21	Digital multimetre	State	3.15	0.58	Utilized
		Federal	3.25		Utilized
22	Analogue multimetre	State	3.75	0.44	Utilized
		Federal	3.75		Utilized
23	Router/ switch	State	2.90	0.34	Utilized
		Federal	2.75		Utilized
24	Crimping tools	State	3.45	0.50	Utilized
		Federal	3.25		Utilized
25	RJ 45	State	2.95	0.36	Utilized
		Federal	3.00		Utilized
26	Cables (cat 3, twisted pair, coaxial and fibre optics	State	3.90	0.38	Utilized
		Federal	3.50		Utilized

Table 1 shows the result of the level of utilization of hardware facilities for teaching electrical installation and maintenance works Federal and State Government Technical Colleges in Lagos State. The result indicates mean values of 2.5 and above and varied standard deviation were recorded for computer, television, radio, computer table/chair, CD-ROM, flash driver, public address system, UPS, digital camera, soldiering iron, digital multimetre, analogue multimetre, router/switch, crimping tools, Rj 45, and cables. This implies that these hardware facilities were adjudged by respondents as utilized. The result indicates that oscilloscope, scanner, interactive board, projector, satellite, flopper drive, deskjet printer, and LCD projector were rarely utilized with mean values below 2.5 Furthermore, smart phone, Hp LaserJet printer, are rarely utilized at state level while it was utilized at federal technical colleges in Lagos state.

Research Question Two: What is the level of utilization of software facilities for teaching electrical installation and maintenance works in Federal and State Technical Colleges in Lagos State?

Table 2 shows the result of the level of utilization of Software facilities for teaching electrical installation and maintenance works in Federal and State Technical Colleges in Lagos State.

Table 2: Level of utilization of Software facilities for teaching electrical installation and maintenance Work in Federal and State Technical Colleges in Lagos State.

S/N	ICT Software facilities	School Ownership	Mean	SD	Decision
	Software	State			
		Federal			
1	Microsoft offices	State	3.60	0.49	Utilized
		Federal	3.75		Utilized
2	Basic interpreter	State	2.40	0.49	Rarely Utilized
		Federal	2.25		Rarely Utilized
3	Typing tutor	State	2.75	0.48	Utilized
		Federal	2.25		Not Utilized
4	Operating system (WindowXp), window 10	State	3.35	0.50	Utilized
		Federal	3.75		Utilized
5	Corel Draw	State	2.35	0.46	Rarely Utilized
		Federal	2.00		Not Utilized
6	AutoCAD	State	2.60	0.57	Utilized
		Federal	2.25		Not Utilized
7	JSSE Development Kit (JDK) (Download from Internet)	State	1.50	0.59	Rarely Utilized
		Federal	1.25		Not Utilized
8	MATLAB (Software for Numerical Computing)	State	1.20	0.41	Rarely Utilized
		Federal	1.25		Rarely Utilized
9	Simulink (GUI based software for Dynamic System Simulation)	State	2.25	0.41	Rarely Utilized
		Federal	2.00		Rarely Utilized
10	Pspice (Electrical Schematic Software)	State	1.15	0.48	Rarely Utilized
		Federal	1.25		Rarely Utilized
11	Multisim (Circuit Simulation and PCB Design Software)	State	1.10	0.42	Rarely Utilized
		Federal	0.50		Rarely Utilized
12	ETAP (An Electrical Engineering Software for Power Systems)	State	1.35	0.50	Rarely Utilized
		Federal	1.50		Rarely Utilized
13	Arduino software	State	1.95	0.54	Rarely Utilized
		Federal	1.50		Rarely Utilized
14	Power World Simulator (Visual Electrical Engineering Software software)	State	1.60	1.51	Rarely Utilized
		Federal	1.25		Rarely Utilized
15	PSCAD (Electromagnetic Transient Analysis Software)	State	1.20	0.38	Rarely Utilized
		Federal	1.00		Rarely Utilized
16	PSS/E (An Electrical Engineering	State	1.25	0.51	Rarely Utilized

	Software for Power System Simulations)	Federal	1.00		Rarely Utilized
17	LabVIEW (Designing Interfacing and HMIs)	State	1.25	0.48	Rarely Utilized
		Federal	0.75		Rarely Utilized
18	AutoCAD software Electrical	State	1.50	0.58	Rarely Utilized
		Federal			Rarely Utilized

Table 2 shows the result of the level of utilization of Software facilities for teaching electrical installation and maintenance works in Federal and State Technical Colleges in Lagos State. The result indicates mean values of 2.00 and varied standard deviation were recorded for software facilities like Microsoft office, basic interpreter, typing tutor, operating system, Corel draw, AutoCAD, JSSE, and AutoCAD electrical software were rarely utilized. Other ICT software facilities such as MATLAB, Simulink, Pspice, Multisim, ETAP, Arduino, Power world simulator, PSCAD, PSS/E, and LabView were rarely utilized.

Test of Hypotheses

Research Hypothesis 1 (HO_1): The level of utilization of hardware facilities for teaching electrical installation and maintenance works in Federal and State Technical Colleges in Lagos State does not depend on school ownership

Table 3 shows Chi-Square test of ownership between Federal and State Government of hardware facilities for teaching electrical installation and maintenance Works in Technical Colleges in Lagos State.

Table 3: Chi-Square test of ownership between Federal and State Government of hardware facilities for teaching electrical installation and maintenance works in Technical Colleges in Lagos State

S/N	ICT Equipment	Ownership		X^2cal	Alpha	X^2crit	Inference
		Federal	State				
1	Computer	50 (14)	69 (110)				
2	Television	3 (14)	5 (110)				
3	Radio	1 (14)	3 (110)				
4	Oscilloscope	3 (14)	25 (110)				
5.	Scanner	2 (2)	2 (11)				
6.	Interactive board	3 (2)	4 (11)				
7.	Projector	3 (2)	18 (11)				
8.	Computer table/chair	50 (67)	74 (547)				
9.	Satellite	-	2 (11)				
10.	CD- ROM	50 (14)	39 (110)				
11	Flash driver	50 (14)	4 (110)				
12.	Public address system	3 (2)	4 (110)				
13	Smart phone	- (14)	1 (110)	1443.189	0.05	37.65	Reject HO_1
14	UPS	20 (14)	6 (110)				
15	Flopper driver	- (14)	3 (110)				
16	Hplaserjet 1200 Printer	3 (2)	5 (11)				
17	Desk jet 6200 Printer	2 (2)	1 (11)				
18	LCD Projector	- (2)	3 (11)				
19	Digital camera	- (14)	- (110)				
20	Solider iron	20 (14)	64 (110)				
21	Digital multimetre	1 (14)	114(11)				
22	Analogue multimetre	1 (14)	74 (110)				
23	Router/ switch	- (2)	- (11)				
24	Crimping tools	5 (14)	48 (110)				
25	RJ 45	5 (14)	111(11) (110)				
26	Cables (cat 3,twisted pair, coaxial and fibre optics	1 (2)	3 (11)				

The result in Table 3 reveals that the calculated value of 1443.189 is greater than the critical value of 37.65 at 29 degree of freedom and 0.05 level of significance. This implies that the level of utilization of hardware facilities for teaching electrical installation and maintenance works in Federal and State Technical Colleges in Lagos State depend on school ownership

Research Hypotheses 2 (HO_2): The level of utilization of software facilities for teaching electrical installation and maintenance works in Federal and State Technical Colleges in Lagos State does not depend on school ownership?

Table 4 shows Chi-Square test of ownership between Federal and State Government of software facilities for teaching electrical installation and maintenance works in Technical Colleges in Lagos State.

Table 4: Chi-Square test of Ownership between Federal and State Government of software facilities for teaching electrical installation and maintenance works in Technical Colleges in Lagos State

S/N	ICT Equipment	Ownership		X^2cal	Alpha	X^2crit	Inference
		Federal	State				
1	Microsoft offices	1 (2)	5 (11)				
2	Basic interpreter	- (2)	1 (11)				
3	Typing tutor	- (2)	2 (11)				
4	Operating system (WindowXp), window 10	1 (2)	5 (11)				
5	Corel Draw	1 (2)	4 (11)				
6	AutoCAD	1 (2)	5 (11)				
7	JSSE Development Kit (JDK) (Download from Internet)	1 (2)	- (11)				
8.	MATLAB (Software for Numerical Computing)	- (2)	- (11)				
9.	Simulink (GUI based software for Dynamic System Simulation)	- (2)	- (11)				
10	Pspice (Electrical Schematic Software)	- (2)	- (11)				
11;	Multisim (Circuit Simulation & PCB Design Software)	- (2)	- (11)				
12	ETAP (An Electrical Engineering Software for Power Systems)	- (2)	- (11)	49.00	0.05	27.59	Reject HO_1
13	Arduino software	1 (2)	2 (11)				
14	Power World Simulator (Visual Electrical Engineering Software software)	- (2)	- (11)				
15	PSCAD (Electromagnetic Transient Analysis Software)	- (2)	- (11)				
16	PSS/E (An Electrical Engineering Software for Power System Simulations)	- (2)	- (11)				
17.	LabVIEW (Designing Interfacing and HMIs)	- (2)	- (11)				
18	AutoCAD software Electrical	1 (2)	2 (11)				

The result in Table 4 reveals that the calculated value of 49.00 is greater than the critical value of 27.59 at 29 degree of freedom and 0.05 level of significance. This implies that the level of utilization of software facilities for teaching electrical installation and maintenance works in Federal and State Technical Colleges in Lagos State depend on school ownership.

IV. Discussion of Findings

In Table 1, Levels of utilization and ownership types of Hardware and Software Information Technology (IT) facilities**.** that there is significant difference in the school ownership mean responses of the facilities usage. This shows that the facilities have a significant in the level of utilization and ownership types of hardware on the students used facilities scores. Thus, the result revealed that there is reasonable level of utilization of hardware facilities for teaching electrical installation and maintenance works Federal and State Government Technical Colleges in Lagos State. However, the result of hypothesis one showed that state underutilized their facilities than federal. The finding is also inline Apulu and Latham (2009) Colleges are facing challenges of un-utilized of hardware and software facilities; poor funding; lack of awareness, skills and training; inconsistent government policies on IT; and epileptic electricity supply. Ajayi and Ekundayo (2009) noted that some of these challenges also include inadequate computer literate teachers; high cost of purchasing hardware, software, multimedia and internet computers for schools; inadequate facilities to support full application of the Hardware and Software Information Technology (IT) facilities.

The study also reveals that there is no significant mean in level of utilization and ownership types of software on the students used facilities scores. However, the result of hypothesis two showed that none of the IT software facilities were adequately utilized. Thomas *et al.,* (2013) reported the benefits of utilizing IT facilities in teaching students in Technical Colleges. These authors posit that the use of IT facilities assist learners to clarify difficult concepts, motivates both teachers and students, saves both teachers and student time; make students active; and simplify teachers work. Laurillard (2013) observed that Hardware and Software Information Technology (IT) facilities in Technical Colleges make students actively engaged in the learning process through

simulation and discussion; and brings about greater IT infrastructure performance more highly than educational institutions with less developed IT infrastructure

V. Recommendations

Based on the findings the recommendations were made:

1. Utilization of available resources: School administrators of both state and federal should ensure there are adequate use of the facility and the resources with the school.
2. Workshop and Training: Teachers and instructors should be provided with adequate training and workshop on IT integration to enhance their instructional competencies.
3. Government Intervention: State and federal governments should allocate targeted funding for IT facility procurement and maintenance in technical colleges.
4. Infrastructure Development: School administrators should Investments in stable electricity and internet connectivity are essential to maximize IT facility utilization.

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