

STRATEGIES FOR ENHANCING ELECTRICAL STUDENTS PERFORMANCE IN DOMESTIC WIRING IN TECHNICAL COLLEGES IN RIVERS STATE NIGERIA

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Abstract

This study investigated the Strategies for Enhancing Electrical Students Performances in Domestic Wiring in Rivers State Technical Colleges. The study adopted a descriptive survey research design. The study had a population of 120 respondents – 4 instructors, 38 electrical teachers and 78 electrical students. No sampling was done as the population was manageable. A questionnaire based on five point likert- scale was used as the data collection instrument. The instrument used for data collection was a structured questionnaire. The questionnaire was Structured on a 5-points Likert- scale of Strongly Agreed (SA), Agreed (A), Undecided (U), Disagreed (D) and Strongly Disagreed (SD). The questionnaire was validated by three experts from the Department of Vocational Teacher Education, University of Nigeria, Nsukka. Internal consistency of the instrument was obtained through Cronbach Alpha reliability method which yielded 0.942 value. Mean and standard deviation were used to answer research questions. The findings revealed, among other things, that all the strategies will enhance electrical students' performances in domestic wiring. The researcher offered recommendations pertaining to the provision of instructional equipment and materials for electrical workshop as this will enhance the electrical students' performances in domestic wiring.

Keywords: *Electrical technology, Performance, Domestic Wiring, and Technical Colleges.*

Introduction

The quality of the education and training given to youth depends greatly on the ability of institutions to adjust their educational content to the changing skill requirements of the nation. In other words, educational institutions are expected to provide knowledge and

training that satisfies the human resource demands of the nation and the nation's economy, (Mayindo, 1995). This is especially true of training in strategic occupations that are rapid with the advent of new technologies. Institutional training should aim to equip students with useful skills and to improve their

knowledge and capabilities in their chosen fields. Technical colleges are established by the Federal Government of Nigeria to prepare individuals to acquire practical skills, basic and scientific knowledge and attitude required by craft men and technicians at sub-professional level in order to achieve the goals of technical education, which shall be to:

- 1) Provide trained manpower in the applied sciences, technology and business particularly at craft, advance craft and technical levels.
- 2) Provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development.
- 3) Give training and impart the necessary skills to individual who shall be self-reliant economically.

In pursuance of the above goals:

(a) The main features of the curriculum activities for technical college shall be structured in Foundation and trade modules.

(b) The components are general education, theory and related courses; workshop practice and Industrial training/production work, (Federal Republic of Nigeria, 2004).

Competencies of student's optimum performance in domestic wiring in Technical colleges are designed to lead the beneficiaries' to self-employment, economic self-sufficiency, and employment generation through short or long-term training and the venue for acquiring practical skills by technical college students is the workshop. Technical college provide technical training in a number of courses including Automobile mechanics, Welding and Fabrication, Plumbing, Painting Furniture making, machine wood-working, carpentry/Joinery, and

Domestic Wiring. Domestic Wiring is one of the Technical College subjects taught in years I, II and III, as stipulated by the National Policy on Education (FRN, 2004). Domestic wiring is the assembly of associated electrical equipment and wires in other to fulfill a specific purpose and having certain coordinated characteristics. The areas covered in these courses include electrical installation, cable joining, battery charging, and the winding of electrical machines. The realization of the objectives of Technical College electrical programmes and their ability to improve student's achievement depends on a number of factors. These include the availability of equipment, tools, and materials, an adequate supply of technical education teachers, and the proper implementation and utilization of technical equipment, tools and materials (Umunadi, 2004).

In extension, Awobodu (2000) has noted that teacher utilization of relevant equipment, materials and tools in teaching domestic wiring facilitates learning and enhances student achievement. Ezeji (1993) highlighted that teacher's utterances, actions, leadership styles, knowledge of the subject and skills in teaching were all considered important factors in student learning. That is, acquisition of the knowledge needed for electrical students optimum performance in domestic wiring during teacher's training will help teachers to subsequently impact knowledge in their implementation of the curriculum and skill acquisition.

However, the skills in domestic wiring involve the application of scientific knowledge and practical skills. The goal of domestic wiring according to National Board for Technical Education NBTE (2003) is to produce skilled craftsmen with good knowledge of the working

principles of domestic wiring, the techniques and safety practices involved in its maintenance. Further-more is to give training and impart the necessary skills leading to the production of competent craftsmen, technicians and other skilled personnel who will be enterprising and self-reliant.

However, performance could be perceived as a method of expressing students' scholastic standing. It could be grades for subjects, or trade courses as symbolized by a score or mark in an achievement test, expressed in numerical scale (Lavin, 2009). Atherson (2003) contended that student's performance is dependent upon several factors among which are instructional methods, learning environment and the learner. Achievement in academics can be in cognitive or psychomotor domain. The cognitive domain according to Okoro (2006) involves knowledge and the development of intellectual skills. This includes the recall or recognition of specific facts, procedural patterns and concepts that serve in the development of intellectual abilities and skills.

Skill according to Osinem (2008) is the proficiency displayed by someone in the performance of a given task. In the context of this study, skill is the ability that an individual has acquired that enables him perform a task efficiently such as using computer numerically controlled machine tools. To effectively use these machines the teacher must possess relevant technical skills which are a skill, expertise or technical competence related to the field of the worker, whether engineering or technical. Technical skill is often associated with the use of tools, equipment related to work, as well as all technical matters. It can be known and understood more easily as it can be seen clearly with the naked eye.

Thus learning in this domain could be in form of identification of metals or recall the safety rules to be observed in the workshop to more intellectual skills such as determining and selecting the best or the combination of appropriate techniques in wiring project. Teachers with good teaching strategies challenge students to work at higher intellectual level. On the other hand, psychomotor domain is concerned with the development of muscular skills coordination. Objectives from this domain emphasize motor skills, manipulation of materials or subjects or an act which requires neuromuscular coordination (Knoll, 2004). This could be a performance task as simple as using a screwdriver to fasten a screw or as using series of tools and instruments in overhauling a machine. In order to sustain gains in cognitive and psychomotor achievement, teaching strategies must be capable of bridging the achievement gap between gender.

The question now becomes to what extent would student's performance be sustained when taught metalwork using inquiry-based teaching technique? Would students prefer being taught metalwork with inquiry-based technique? This gap in knowledge underscores the need to examine the effect of inquiry-based teaching technique on the performance of metalwork students. Therefore, there is need to investigate the effect of inquiry-based teaching technique on the performance of metalwork students in technical colleges.

The basic aim of teaching domestic wiring in technical colleges is to give training and impart the necessary skills leading to the production of craftsmen, technicians and other skilled personnel who will be enterprising and self-reliant (NBTE 2003). In extension, the programme is aimed at providing the

trainee with complete secondary education in critical subjects like English Language, Economics, Physics, Chemistry, Biology, Entrepreneurial Studies and Mathematics to enhance the understanding of machines, tools and materials of their trades and their application and as a foundation for post-secondary technical education. Hence, it is hoped that trainees who successfully complete their trade and general education in the technical colleges should be able to compete with their secondary school counterparts for direct entry into the polytechnics or colleges of education (technical) for ND or NCE courses respectively.

Contrary to achieving the above goal, majority of students have been completing the programme with very poor skills performance and inadequate skills which is incapable of earning them a living. In this regard, the employers of labour responded by non-demand of the graduates of technical colleges. Employers prefer to develop their own in-house craftsmen instead of employing the half baked graduates produced in technical colleges. This decline in students performance has been associated to a number of factors, among which is the strategy employed in impacting wiring skills to the learners (Akinyele , 2000).

This unsatisfactory situation could lead to breakdown in the economy, industrial, technological and educational growth of a nation since the main goal of technical education is to achieve self-reliance. The foregoing therefore underscores the need to explore other Strategies for Enhancing Electrical Students Performance in Domestic Wiring. Therefore, the problem of this study is: what are the Strategies for Enhancing Electrical Students Performance in Domestic Wiring in Rivers State Technical Colleges.

The general purpose of the study is to identify the Strategies for enhancing Electrical Students Performance in Domestic Wiring in Rivers State Technical Colleges. Specifically the study tends to explore the following: Strategies that will enhance

1. Domestic Surface Wiring Techniques
2. Domestic Conduit Wiring skills
3. Principles of Protecting Electrical Devices
4. Sequences For Inspection, Testing and commissioning Of Domestic Installations

Research questions

The following research questions were posed to guide the study:

1. What Strategies will enhance Domestic Surface Wiring Techniques?
2. What Strategies will enhance Domestic Conduit Wiring skills?
3. What Strategies will enhance the principles of Protecting Electrical Devices?
4. What Strategies will enhance the Sequences for Inspection, Testing and commissioning of Domestic Installations?

METHOD

This study adopted a descriptive research design in all the technical colleges in Rivers State. The study's sample contained four technical instructors, 38 electrical technical teachers and 78 electrical students, for a total population of 117 respondents. A questionnaire based on five point Likert- scale was used as the data collection instrument. The instrument used for data collection was a structured questionnaire. This developed questionnaire was structured and grouped into five parts. Part1: Seeks on personal data of the respondents. Part

2: Contains items which seek information on the different types of domestic surface wiring techniques. Part 3: Dealt with items which seek information on the different types of domestic conduit wiring. Part 4: Dealt with items which seek information on the principles of protecting electrical devices and Install Them. Part 5: Dealt with items which seek information on the sequences for inspection, testing and commissioning of domestic installations. Section 2 was

structured on a 5-points likert- scale of Strongly Agreed (SA), Agreed (A), Undecided (U), Disagreed (D) and Strongly Disagreed (SD). The questionnaire was validated by three experts from the Department of Vocational Teacher Education, University of Nigeria, Nsukka. Internal consistency of the instrument was obtained through Cronbach Alpha reliability method which has a Cronbach alpha of 0.942 value.

Results

Research question 1: What Strategies will enhance Domestic Surface Wiring Techniques?

Table 1: Mean Responses on Strategies for Domestic Surface Wiring Techniques.

S/NO	ITEMS	X	SD	REMARK
1.	Ability to identify symbols used in electrical engineering drawing of an electrical installation.	1.61	.491	D
2.	Ability to interpret the scale used in working drawing	4.85	.596	SA
3.	Ability to locate the position of the various accessories on a drawing	4.07	.381	A
4.	Ability to list all the electrical accessories required for a job from the working drawing	4.24	.580	A
5.	Ability to interpret the distribution system from a drawing	4.30	.460	A
6.	Ability to fixing cable to a surface	4.30	.662	A
7.	Ability to identify cable types and sizes used for lighting, heating, cooker and socket outlets	4.51	.502	SA
8.	Ability to identify cable rating, maximum load demand and ambient temperature	4.46	.691	A
9.	Ability to use plumb line, chalk line and spirit level.	4.55	.500	SA
10.	Ability to carry out simple, surface wiring of building (residential) using appropriate tools.	4.21	.833	A
11.	Ability to state relevant statutory regulations regarding surface wiring	4.47	.634	A
12.	Ability to apply the regulations of Electrical Board of Nigeria and National Electric	4.29	.456	A

Power Authority (NEPA) on surface wiring.

Table 1 revealed that item 2, 7 and 9 had mean within the real limit of numbers 3.50-4.49 indicating that the items are in agreement that the Strategies will enhance the different Types of Domestic Surface Wiring Techniques. Furthermore, item 3, 4, 5, 6, 8, 10, 11, and 12 had mean that are within the real limit of numbers 4.50-5.00 indicating that the

items are in strong agreement that the Strategies will enhance the different Types of Domestic Surface Wiring Techniques. However, item 1 had a mean within the real limit of numbers 1.50-2.49 indicating that the item disagreed with that the Strategies will enhance the different Types of Domestic Surface Wiring Techniques.

Research question 2: What Strategies will enhance Domestic Conduit Wiring skills?

Table 2: Mean Responses on Strategies for Domestic Conduit Wiring skills

S/NO	ITEMS	X	SD	REMARK
1.	Ability to explain the meaning of conduit	4.70	.717	SA
2.	Ability to state the advantages and disadvantages of conduit installation.	4.31	.521	A
3.	Ability to identify types of conduits; steel conduit, flexible conduit and PVC conduit.	4.31	.539	A
4.	Ability to state the applications of sticks, taps and dies, and hacksaw	4.25	.646	A
5.	Ability to state relevant conduit statutory Regulations	4.38	.735	A
6.	Ability to explain appropriate procedures for preparing conduit for Installation	4.36	.829	A
7.	Ability to use of running coupler, conduit boxes, bend, elbows, tees and accessories for conduit work.	4.38	.682	A
8.	Ability to draw in cables using fish wire	4.48	.692	A
9.	Ability to test the installation as stipulated by the statutory regulations	4.36	.676	A
10.	Ability to maintain tools and equipment used on conduit installation.	4.46	.571	A
11.	Ability to determine set and bend permissible radial length	4.43	.631	A

Table 2 revealed that item 2, 3, 4, 5, 6, 7, 8, 9, 10 and 11 had mean within the real limit of numbers 3.50-4.49 indicating that the items agreed that the Strategies will enhance the different Types of Domestic Conduit Wiring skills. Further-

more, item 1 had a mean that is within the real limit of numbers 4.50-5.00 indicating that the item strongly agreed that the Strategies will enhance the different Types of Domestic Conduit Wiring skills.

Research question 3: What Strategies will enhance the principles of Protecting Electrical Devices?

Table 2: Mean Responses on the Strategies for Protecting Electrical Devices

S/NO	ITEMS	X	SD	REMARK
1.	Ability to identify common types of protective devices	4.64	.484	SA
2.	Ability to explain the principles and application of circuit breakers and fuses in electrical installation	4.33	.471	A
3.	Ability to determine current rating of Fuses	4.41	.566	A
4.	Ability to identify the earthing system of electrical installations and devices	4.32	.722	A
5.	Ability to state the regulations relating to various types of protective devices	4.58	.496	SA
6.	Ability to use current and voltage operated earth leakage circuit breaker observing relevant regulations.	4.46	.620	A

Table 3 revealed that item 2, 3, 4 and 6 had mean within the real limit of numbers 3.50-4.49 indicating that the items agreed that the Strategies will enhance the principles of Protecting Electrical Devices. Further-more, item 1 and 5 had mean that are within the real limit of numbers 4.50-5.00 indicating that the item strongly agreed that the Strategies will enhance the principles of Protecting Electrical Devices

Research question 4: What Strategies will enhance the Sequences for Inspection, Testing and commissioning Of Domestic Installations?

Table 4: Mean Responses on the Strategies for Sequences for Inspection, Testing and commissioning of Domestic Installations

S/NO	ITEMS	X	SD	REMARK
1.	Apply statutory safety regulations for life, properties and environment	4.82	.384	SA
2.	Visually detect electrical and mechanical loose connections	4.53	.572	SA
3.	Explain 3 types of electrical Installation Tests	4.26	.812	A

Table 3 revealed that item 3 had a mean within the real limit of numbers 3.50-4.49 indicating that the items agreed that the Strategies will enhance the Sequences for Inspection, Testing and commissioning Of Domestic Installations. Further-more, item 1 and 5 had mean that are within the real limit of

numbers 4.50-5.00 indicating that the item strongly agreed that the Strategies will enhance the Sequences for Inspection, Testing and commissioning Of Domestic Installations.

Discussion of Findings

The finding from table 1 disagreed that ability to identify symbols used in electrical engineering drawing of an electrical installation is a Strategy that will enhance the different Types of Domestic Surface Wiring Techniques. However, the findings agreed that ability to interpret the scale used in working drawing, ability to locate the position of the various accessories on a drawing, ability to list all the electrical accessories required for a job from the working drawing, Ability to interpret the distribution system from a drawing, Ability to fixing cable to a surface, Ability to identify cable types and sizes used for lighting, heating, cooker and socket outlets, Ability to identify cable rating, maximum load demand and ambient temperature, Ability to use plumb line, chalk line and spirit level, Ability to carry out simple, surface wiring of building (residential) using appropriate tools, Ability to state relevant statutory regulations regarding surface wiring and Ability to apply the regulations of Electrical Board of Nigeria and National Electric Power Authority (NEPA) on surface wiring are Strategies that will enhance the different Types of Domestic Surface Wiring Techniques. This is in line with Ubong and Oguzor (2007) who explained that Teachers, curricula and Schools teaching technical and vocational courses have to emphasize on the practical aspect of the different specialties in technical and vocation education.

The findings in table 2 agreed that Ability to explain the meaning of conduit, Ability to state the advantages and disadvantages of conduit installation, Ability to identify types of conduits; steel conduit, flexible conduit and PVC conduit, Ability to state the applications of sticks, taps and dies, and hacksaw,

Ability to state relevant conduit statutory Regulations, Ability to explain appropriate procedures for preparing conduit for Installation, Ability to use of running coupler, conduit boxes, bend, elbows, tees and accessories for conduit work, Ability to draw in cables using fish wire, Ability to test the installation as stipulated by the statutory regulations, Ability to maintain tools and equipment used on conduit installation and Ability to determine set and bend permissible radial length are the Strategies that will enhance the different Types of Domestic Conduit Wiring skills. This is in line with Okorie (2000) who dictated that the school environment should expose students to the use of the Basic Electricity equipment in a way that will lead students to acquire relevant knowledge and skills.

The findings in table 3 agreed Ability to identify common types of protective devices, Ability to explain the principles and application of circuit breakers and fuses in electrical installation, Ability to determine current rating of Fuses, Ability to identify the earthing system of electrical installations and devices, Ability to state the regulations relating to various types of protective devices and Ability to use current and voltage operated earth leakage circuit breaker observing relevant regulations are the Strategies that will enhance the principles of Protecting Electrical Devices. This is in agreement with Ukoha (2007) encourages teachers to teach through practice as experience shows that students learn best by practice, especially with regard to psychomotor activities, which in turn become more advanced. He did observe, however, that some of the equipment supplied to schools has begun to rust in crates, as it was never installed for use in the Colleges.

The findings in table 4 agreed Apply statutory safety regulations for life, properties and environment, Visually detect electrical and mechanical loose connections and Explain 3 types of electrical Installation Tests are the Strategies that will enhance the Sequences for Inspection, Testing and commissioning Of Domestic Installations. This is in line with Okorie (2000) contends that the workshops, laboratories and the overall vocational education environment must be adequately equipped so as to reflect the actual working environment beyond the classroom.

Conclusion

School workshop, laboratories and the environment where vocational and technical education is given must be adequately equipped to reflect the actual working environment for the electrical students. It is recognized globally that electrical workshop should be well equipped with instructional facilities. In short the workshop should look like the workshop where the electrical students will work after the training. It is only through this way that the students' effectiveness and efficiency in the world of work can be ensured after training. Hence all these strategies if put in place will enhance electrical student's performance.

Recommendations

- (1) The government should supply Electrical equipment, materials and tools to the Colleges in large numbers to cater to the ever-growing population of students.
- (2) The government should train Electrical teachers to enable to properly use the equipment in the Technical Colleges.

- (3) The Electrical equipment, materials and tools supplied to the Technical Colleges should be installed and adequate power supply from the Power Holding Company of Nigeria (PHCN) must be made available.
- (4) Electrical courses require the services of a well trained and qualified Electrical teacher to utilize and handle the complex and sophisticated tools and equipment and to teach the theoretical and practical aspect of the subject.
- (5) The government should seek the assistance of trained and qualified Electrical teachers and technical experts to advise the appointed government representatives on the types of Electrical equipment, tools, and materials needed in the Technical Colleges

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