WORK SKILLS REQUIRED FOR SELF-EMPLOYMENT OF ELECTRICAL INSTALLATION AND MAINTENANCE WORKS GRADUATES OF TECHNICAL COLLEGES IN ANAMBRA STATE

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Abstract
In the face of limited employment opportunities in Nigeria today, self-employment has emerged as a viable and often necessary path for graduates of technical college electrical installation and maintenance graduates. This study was designed to find out work skills required of these graduates for self-employment. Two research questions were formulated to guide the study. Also, two hypotheses were tested that guided the study. The study adopted a descriptive survey research design. The population of the study was one hundred and eighty- eight (188) respondents (teachers and electricians). This was made up of twelve (12) electrical installation and maintenance works teachers in technical colleges and one hundred and fifty -seven (157) registered electricians in the Association of Building artisans/craftsmen of Nigeria. Census sampling was adopted for the study. Questionnaire was the instrument used for data collection. Questionnaire was used for both the teachers and electricians. The questionnaire contains thirty (30) items. The instrument was validated by three experts and internal consistency of the instrument was established using Cronbach Alpha method and this yielded a reliability coefficient of 0.79. Data collected were analyzed using mean and t- test statistic. Statistical Package for Social Science (SPSS) was employed in the analysis of data. Based on the data analyzed, some of the findings made include that the technical college graduates require installation skills and maintenance skills. Based on the findings, recommendations were made. Some of the recommendations made include that; the curriculum of technical colleges should be reviewed and updated so as to include the identified skills, technical college teachers should be involved in regular in-service training, workshops and industry attachments to remain updated with current industry practices, and that government should provide adequate funding, modern tools, and equipment for technical colleges to enable effective skill training.

Keywords: *Technical Skills, Generic Skills, Self-Employment, Electrical Installation and Maintenance Works students*

Introduction

Unemployment among graduates has become a significant concern in many developing countries, including Nigeria. Despite the increasing demand for skilled workers in various sectors, many graduates especially from technical institutions, struggle to secure meaningful employment or venture into self-employment. The gap between the skills acquired during training and the skills required for self-employment has been a recurring issue particularly in fields like electrical installation and maintenance. Ejidike (2015) stated for our education to meet the demand of the society, the students must be provided with skills that will help them work collaboratively and sensibly in a team, become decision –makers, plan and manage their time effectively, listen to one another and choose the right communication strategy at the right time.

In Nigeria today, technical colleges play a pivotal role in developing the skilled workforce required for the nation's socio-economic development (NBTE,2024). Technical colleges offer courses leading to the acquisition of National Technical Certificates (NTC). These courses include carpentry and joinery, cabinet and furniture, metalwork, electrical/electronics, block laying and concretry, vehicle maintenance, mechanical engineering technology at sub-professional level among others. The basic aim of electrical installation and maintenance works in technical colleges is to give training and impart the necessary skills leading to the production of craftsmen, technicians, technologists and other skilled personnel who are enterprising and self-reliant. Technical education aims to equip students

with practical and theoretical knowledge that aligns with industry needs. The objectives of technical education according to Federal Republic of Nigeria (2013), include: To provide manpower in the applied sciences, technology and business particularly at craft, advanced craft and technical levels, To provide the technical knowledge and vocational skills necessary for agricultural, commercial and economic development, To give training and impart the necessary skills to individuals who shall be self-reliant economically. Osuala (2011), outlined the objectives of technical education as follows: To provide technological literacy to all students thus preparing every student for life in technological age, to help develop the right attitude towards work and habits of mind conducive to the proper use of technology, to equip school leavers with skills to earn a living, to stimulate and encourage creativity. Electrical installation and maintenance works is one of the trade subjects taught in technical schools whose aim is to give training and impart the necessary skills leading to the production of craftsmen, technicians, technologists and other skilled personnel who are enterprising and self-reliant.

Electrical Installation and maintenance works is a critical trade taught in technical colleges, covering areas such as wiring, maintenance and repair of electrical systems. Electrical Installation and maintenance work as taught in technical colleges is expected to prepare individuals with job-satisfying requirements towards employment and self-reliance. It is the construction or installation of electrical wiring and the permanent attachment or installation of electrical products in or on any structure that is not itself an electrical product, also it is the installation, repair, alteration and maintenance of electrical conductors, fittings, devices and fixtures for heating, lighting or power purposes, regardless of the voltage. Electrical Installation and Maintenance Works refers to the practical and theoretical training involved in wiring buildings, installing electrical equipment, and maintaining electrical systems to ensure they work safely and efficiently. It prepares students to become skilled electricians and electrical technicians. The aims of teaching EIMW in technical colleges include: To train skilled electricians who can install and maintain electrical systems, to develop practical skills in electrical wiring and equipment installation, to promote safety practices when working with electricity, to prepare students for employment or self-reliance in electrical work, To provide knowledge of electrical tools, materials, and equipment. (Osuala 2011). Areas covered in Electrical Installation and Maintenance Works includes: electrical installation, electrical maintenance, electrical machines and appliances and testing and safety. Graduates of Electrical Installation and Maintenance Works can work as: electricians, electrical technicians, maintenance officers, electrical contractors, industrial electricians, self-employed electrical installer. Electrical installation and maintenance is a practical oriented trade and it is expected that the technical college graduates in this area would be automatically employed or self-employed once they are equipped with the necessary skills.

Skill is ability in action. It is the ability to do a job and the competency in using knowledge effectively. To possess a skill is to demonstrate the habit of acting; thinking and behaving in a specified activity in such a way that the process becomes natural to the individual through repetition and practice (Ogbuanya, in Ejidike 2015). Work skills refer to the abilities, knowledge and expertise an individual possesses that are relevant to performing tasks duties and responsibilities within a professional or work environment. These skills can be acquired through education, training and hands-on experience, and they are essential for effectively contributing to a specific job or career. Work skills is based on hard or technical skills (installation and maintenance skills)

Technical skills are specialized knowledge and expertise required to perform specific tasks and use specific tools and programmes in real work situations. Diverse technical skills are required in just about every field and industry. According to Evans (2023) technical skills are the ability to use tools and equipment to safely install, maintain and repair electrical systems. They are talents and expertise a person possesses to perform a certain job. They are important in workplace in that they represent the requirements necessary to properly perform a job. Evans (2023) stated that technical skills are the ability to use tools and equipment to safely install, maintain and repair electrical systems. Technical skills are often related to the use of tools, equipment, machines, and specific techniques needed for a job. Examples of technical skills; Electrical wiring and installation, Operating machines

and tools, Computer programming, equipment maintenance and repair, mechanical servicing, data analysis, use of technical software. In technical colleges, students develop technical skills through workshop practice, laboratory activities, demonstrations, and industrial training. These skills enable them to perform professional tasks in areas such as engineering, construction, electrical work, and information technology. Technical skills are important because they: enable workers to perform specialized tasks effectively, improve efficiency and productivity in the workplace, help workers meet industry standards and professional requirements. For graduates to be self- employed, they need to be equipped with requisite skills (technical skill). Technical skills are essential for successful job performance because they aid in improving job performance and productivity, enhancing employability of workers, promoting effective teamwork and communication, helping workers adapt to technological and organizational changes, encouraging innovation and problem-solving in the workplace. These skills are being taught by teachers and even electricians in the field.

Teachers in technical colleges are responsible for imparting knowledge and skills to students. Teachers teach the theoretical and practical aspects of technical skills such as electrical installation, machine operation, and maintenance. Electricians are skilled workers who apply electrical knowledge and skills in real work environments such as homes, industries, and construction sites. Electricians demonstrate and apply practical electrical installation and maintenance skills, such as wiring buildings, installing electrical appliances, troubleshooting electrical faults, and repairing electrical systems. Their experience helps to show how technical skills are used in real-life situations. Self-employment often require workers to possess technical competence to function effectively and survive in the world today even in different states of the country including Anambra state.

Anambra state, known for its vibrant entrepreneurial culture, offers significant opportunities for self-employment in trades like electrical installation and maintenance. However, technical college electrical installation and maintenance works graduates may not benefit from these opportunities without possessing the necessary skills (technical skills) required for business success in the 21st century competitive business world. These challenges highlight the need for a comprehensive understanding of the specific skills that can enable graduates to establish and sustain their businesses successful.

This study is driven by the urgent need to align technical education with the realities of self-employment in the electrical trade. By identifying the essential work skills required of electrical installation and maintenance graduates, this research aims to inform curriculum development, policy making and skill enhancement initiatives. This study focuses on identifying the work skills required of electrical installation and maintenance works of technical colleges in Anambra state to thrive as self-employed individuals. Ultimately, equipping these graduates with relevant technical and maintenance will not only improve their employability but also contribute to economic growth and poverty alleviation in Anambra state.

Statement of the Problem

Despite the objectives of technical colleges to produce graduates with employable skills, there is growing concern that many graduates of electrical installation and maintenance works lack the competencies required for effective self-employment in Anambra State. This situation may not be unconnected with the manner in which skills are taught in technical colleges. Despite the increasing demand for skilled electricians in various sectors, many graduates struggle to secure employment or successfully venture into self-employment. This challenge raises concerns about the adequacy of the skills acquired during their training and their relevance to real-world work environments.

In line with Prosser's Theory of Vocational Education, effective skill acquisition requires that the training environment should replicate the real work environment. However, observations suggest that instructional practices in many technical colleges do not adequately reflect real-world conditions in terms of equipment, tools, and practical experiences. As a result, students may acquire theoretical knowledge without sufficient practical exposure to workplace realities. This mismatch between training and actual job requirements appears to create a gap in the skills possessed by graduates, thereby limiting their ability to function effectively as self-employed electrical technicians.

Consequently, there is a need to identify the specific work skills required which these skills are lacking among graduates.

If this skill gap is not addressed, the issue of unemployment and underemployment among technical college graduates in Anambra State will persist, leading to wasted potential and increased economic hardship. Therefore, this study seeks to identify the specific work skills- technical skills that are required of electrical installation and maintenance works graduates of technical colleges in Anambra State to thrive in self-employment.

Purpose of the Study

The purpose of this study is to determine the work skills required of electrical installation and maintenance works graduates of technical colleges for self-employment in Anambra state.

Specifically, this study is sought to:

1. Identify electrical installation skills required of Technical College electrical installation and maintenance works graduates (TC-EIMWG) for self-employment in Anambra state.
2. Identify electrical maintenance skills required of Technical College electrical installation and maintenance works graduates (TC-EIMWG) for self-employment in Anambra state.

7 Hypotheses

The following hypotheses are formulated and would be tested at 0.05 level of significance

H_{O1}: There is no significant different in the mean ratings of electricians and teachers on the electrical installation skills required of TC-EIMWG for self-employment

H_{O2}: There is no significant different in the mean ratings of electricians and teachers on the electrical maintenance skills required of TC-EIMWG for self-employment

Methodology

This study adopted a descriptive survey research design. Descriptive survey research design is a method used to gather information from a sample of individuals through their responses to questions. It aims to describe the characteristics of a population or phenomenon bring studied. It is used to identify and analyze trends, patterns and relationships within the data collected (Creswell and Creswell, 2019; Fowler 2014). This design is considered appropriate for this study because it involves selecting and studying samples of the population in order to make value judgement about the respondents from cross section of electrical installation teachers and electricians.The area of this study is Anambra State. Anambra state is one of the thirty-six (36) states in Nigeria. I The state has eleven Government Technical Colleges located at Umunze, Umuchu, Utuh, Enugu-Agidi, Ihiala, Nkpor, Onitsha, Osomala, Oleri, Ogidi, Nnewi and Awka. The population of the study is made up of two categories of people as which consists of thirty- one (31) electrical installation teachers in technical colleges and one hundred and fifty-seven (157) electricians registered with the Association of Building artisans/craftsmen of Nigeria. These gave a total of one hundred and eighty-eight (188). This 188 constituted the population of the study. Dues to the manageable size of the population, census sampling was adopted.

The instrument for data collection was structured questionnaire. The questionnaire was used for both the teachers and the electricians. The questionnaire has three (3) sections- A, B & C. Section A is on background information of the respondents. Section B on electrical installation skills required of technical college electrical installation and maintenance works graduates of technical colleges, has fifteen (15) items and section C is on electrical maintenance skills required of technical college electrical installation and maintenance works graduates, which has fifteen (15). Five (5) point likert

scale response pattern of Very Highly Required (VHR), Highly Required (HR), Averagely Required (AR), Slightly Required (SR) and Not Required (NR). The instrument was subjected to face validation by three experts; two from Faculty of Technology and Vocational Education and one from the Department of Educational Foundations, all from Nnamdi Azikiwe University Awka. Personal contact approach was adopted in administering and collecting the questionnaire from the respondents. The data collected for the study were analyzed using mean, standard deviation and t- test statistic. Precisely, Mean was used to answer research questions while standard deviation was used to check the closeness of their responses. The mean from each item were interpreted in relation to the real limit of the numbers on the scaling point. The use of real limit of numbers is necessary because there was need to clearly indicate fine distinction among the items. Therefore, any item that receives mean rating between 4.50-5.00 was described as Very Highly Required, mean ratings between 3.5- 4.49 was regarded as Highly Required, items with mean values between 2.50 - 3.49 was regarded as Slightly Required while items with mean values between 1.00 - 1.49 was regarded as Not Required. For the purpose of obtaining the internal consistency of the instruments, the t-test analysis was done using Statistical Package for Social Sciences (SPSS) based on the statistical tools mentioned earlier. The null hypothesis was significant where the probability value (p- value) was less than the .05 significance level at appropriate degree of freedom, otherwise the null hypothesis was not significant. Cronbach Alpha reliability coefficient method was used, a reliability coefficient value of 0.76 was obtained.

Presentation of results

Research question 1: What are the electrical installation skills required of technical college electrical installation and maintenance works graduates for self-employment in Anambra state?

Analysis of data for the research question is presented in Table 1

Table 1
Mean ratings and standard deviation of respondents on electrical installation skills required of technical college electrical installation and maintenance works graduates for self-employment

S/N	ITEMS	X_E	X_T	$\bar{X}$	SD_E	SD_T	SD	Decision
1	Design a wiring diagram that will show location of outlets, switches and fixtures	4.56	4.65	4.57	0.68	0.48	0.65	Very highly required
2	Interpret electrical wiring diagram [blue print]	4.66	4.58	4.64	0.55	0.56	0.55	Very highly required
3	Ability to install and connect earthing systems	4.79	4.80	4.80	0.41	0.40	0.40	Very highly required
4	Determine the quantities of materials that would be needed in a house	4.56	4.61	4.57	0.65	0.49	0.62	Very highly required
5	Distinguish between different coloured wires functions [color code]	4.66	4.71	4.68	0.47	0.44	0.47	Very highly required
6	Determine number of outlets and switches that will run in a circuit	4.63	4.68	4.64	0.48	0.48	0.48	Very highly required
7	Use hand and power tools efficiently-wire strippers, pliers, voltage tester, screwdriver and power drills	4.72	4.81	4.74	0.45	0.40	0.44	Very highly required

8	Drill wire holes efficiently ensuring that you know what is on the other side of the wall to avoid drilling through them [electrical wires, duct work or water pipe]	4.76	4.71	4.75	0.43	0.46	0.43	Very highly required
9	Mount electrical boxes for outlets, switches and fixtures	4.68	4.81	4.70	0.58	0.40	0.56	Very highly required
10	Install conduits, cables, tubing through walls and ceiling to connect the boxes	4.68	4.84	4.71	0.53	0.37	0.51	Very highly required
11	Install outlets, switches and fixtures to the wiring	4.70	4.74	4.70	0.53	0.44	0.51	Very highly required
12	Set a breaker box where it can be easily accessed at any time	4.72	4.84	4.74	0.53	0.37	0.51	Very highly required
13	Secure wiring using staples or clips to prevent from sagging	4.68	4.54	4.66	0.55	0.51	0.54	Very highly required
14	Test system switch with voltage tester	4.59	4.39	4.55	0.62	0.80	0.66	Very highly required
15	Properly close up walls after wiring	4.70	4.32	4.64	0.46	0.83	0.56	Very highly required

N= 182 (N_E = 151, N_T = 31); T = Teachers, E = Electricians, X =Mean, SD= Standard Deviation

Table 1 shows that 15 skills (items 1-15) are very highly required as illustrated by their mean ratings ranging from 4.55– 4.80. Also, the SD values indicate that the respondents have homogenous views on the items

Research question 2:

What are the electrical maintenance skills required of technical college electrical installation and maintenance works graduates in for self-employment in Anambra state?

Analysis of data for this research question is presented in table

Table 2

Mean responses and standard deviation of respondents on electrical maintenance skills required of technical college electrical installation and maintenance works graduates for self- employment.

S/N	ITEMS	$\bar{X}$			SD			
		X_E	X_T	X	SD_E	SD_T	SD	Decision
1	Understand the schematics of a building for accurate repairs and maintenance	4.64	4.68	4.65	0.57	0.65	0.58	Very highly required
2	Ability to detect and replace damaged electrical cables and wiring	4.79	0.41	4.79	0.41	0.44	0.41	Very highly required
3	Use variety of tools and testing equipment in identifying faults in a building	4.83	0.38	4.81	0.38	0.44	0.39	Very highly required

4	Test equipment, instrument and systems to detect the faulty areas	4.86	0.35	4.87	0.35	0.30	0.34	Very highly required
5	Have wiring ability and installation procedure to enable you carry out maintenance work	4.74	0.44	4.76	0.44	0.34	0.43	Very highly required
6	Evaluate electrical load on different circuits to ensure they are not overloaded	4.67	0.56	4.66	0.56	0.87	0.55	Very highly required
7	Diagnose electrical system malfunction and failure (trouble shooting) by using a multimeter to test voltage ,continuity and resistance in various parts of electrical system	4.83	0.72	4.78	0.72	0.63	0.44	Very highly required
8	Perform insulation resistance tests to check for deteriorating insulation that could lead to shorts or fires	4.70	0.57	4.69	0.57	0.49	0.55	Very highly required
9	Replace outlets and switches if they are damaged, outdated or not functioning properly	4.93	0.26	4.92	0.26	0.34	0.28	Very highly required
10	Replace light fixtures if they are not working or are outdated	4.92	0.27	4.91	0.27	0.34	0.28	Very highly required
11	Examine all visible wiring, switches, and fixtures for signs of wear ,damage or corrosion	4.78	0.50	4.79	0.50	0.34	0.49	Very highly required
12	Use a circuit tester to determine that outlets are properly wired and grounded	4.70	0.53	4.74	0.53	0.30	0.50	Very highly required
13	Prevent minor faults from developing into major breakdowns by tighten connections and terminals to prevent loose connections that can lead to overheating	4.60	0.60	4.63	0.60	0.42	0.58	Very highly required
14	Reduce break down periods of wires and appliances by carrying out routine inspection to identify wear, corrosion or damage	4.60	0.62	4.59	0.62	0.72	0.64	Very highly required
15	Stay updated on electrical codes and regulations so as to be able to maintain and repair electrical systems	4.59	0.62	4.59	0.62	0.67	0.63	Very highly required

N= 182 (N_E = 151, N_T = 31); T = Teachers, E = Electricians, X =Mean, SD= Standard Deviation

Table 2 shows that 15 skills (items 1-15) are very highly required as illustrated by their mean ratings ranging from 4.59– 4.92. Also, the SD values indicate that the respondents have homogenous views on the items.

Hypothesis testing

Hypothesis 1**:** There is no significant different in the mean ratings of electricians and teachers on the electrical installation skills required of TC-EIMWG for self-employment

The statistical test of this hypothesis is presented in Table 5

Table 5

Summary of t- test analysis of mean ratings of electricians and teachers on electrical installation skills required of technical college electrical installation and maintenance works graduates for self-employment in Anambra state.

Variables	N	X	SD	t	df	p-value	Mean Difference	Std. Error Difference	Decision
Electricians	151	4.67	0.53	0.43	180	.966	.06131	1.44244	NS
Teachers	31	4.67	0.50						

Table 5 shows that there is no significant difference in the mean ratings of electricians and teachers on electrical installation skills required of technical college electrical installation and maintenance works graduates for self-employment. This is shown by the p-value of .966 which is greater than the sig value of .05. Therefore, the null hypothesis was retained.

Hypothesis 2: There is no significant different in the mean ratings of electricians and teachers on the electrical maintenance skills required of TC-EIMWG for self-employment.

The statistical test of hypothesis is presented in table 6

Table 6: Summary of t-test analysis of mean ratings of electricians and teachers on the electrical maintenance skills required of technical college electrical installation and maintenance works graduates for self-employment in Anambra State.

Variables	N	X	SD	t	df	p-value	Mean Difference	Std. Error Difference	Decision
Electricians	151	4.75	0.49	.107	180	.915	.13416	1.25914	NS
Teachers	31	4.74	0.49						

Table 6 shows that there is no significant difference in the mean ratings of electricians and teachers on electrical maintenance skills required of technical college electrical installation and maintenance works graduates for self-employment. This is shown by the p-value of .915 which is greater than the significant value of .05. Therefore, the null hypothesis was retained.

Discussion

The findings of this study have been arranged and discussed according to the issues addressed by the research questions.

Electrical installation skills required of Technical College Electrical installation and maintenance works graduates for self-employment.

The study found that electrical installation skills are very highly required for self-employment of the electrical installation and maintenance works graduates. The 15 skills under this category were all rated very highly required, indicating how important these core skills are in enhancing employability of electrical installation and maintenance works graduates. This finding is in line with the views of Cauldwell (2022) who stated that wiring a house has procedures which sequential and must be followed by any electrician during house wiring.The author summarized the steps /skills to install electrical boxes, install outlets, switches and fixtures, test the system, secure wiring and close walls. This is a clear indication that technical skills are very crucial for successful entrepreneurship.

Electrical maintenance skills required of technical college electrical installation and maintenance work graduates for self- employment.

The study found that electrical maintenance skills are very highly required for self-employment of the electrical installation and maintenance works graduates. The 15 skills under this category were all rated very highly required, indicating how important these core skills are in enhancing employability of electrical installation and maintenance works graduates. This finding is in line with views of Steve (2014) who stated that maintenance is responsible for the upkeep and repair of electrical equipment and systems. They use a variety of tools and testing equipment to identify and

resolve issues, they must be able to read and interpret schematics and technical manuals. The author also stated that the ability to wire an electrical system is critical skill for any maintenance electricians. Without this skill, you would be unable to install or repair electrical system. Also the finding is in line with the views of Shayne (2018) who stated that for one to excel in the repair and maintenance of electrical works in buildings, one should possess skills such as understanding various electrical systems, circuits, components in buildings, competence in electrical wiring and installation procedure, ability to interpret electrical blueprints and schematics for accurate repairs and maintenance, stay updated on electrical codes and regulations to ensure work meets legal standards, proficiency in use of tools and power drills and implementing preventive measures to avoid potential electrical problems. This is a clear indication that maintenance skills are very important for a successful entrepreneurship.

Conclusion

Based on the findings of this study, it is concluded that Technical College electrical installation and maintenance work graduates require electrical installation and maintenance very highly in order to be successfully self-employed. It is also concluded that every aspect of the skills (electrical installation and electrical maintenance) is very important if self- employment among the TC-EIMWG is to be achieved.

Recommendations

Based on the findings of the study, the following recommendations were made.

1. The curriculum of technical colleges should be reviewed and updated so as to include the identified skills.
2. Technical college teachers should be involved in regular in-service training, workshops and industry attachments so they remain updated with current industry practices.
3. The government should provide adequate funding, modern tools, and equipment for technical colleges to enable effective skill training

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