

**ELECTRICAL ENGINEERING TRADE SKILLS REQUIRED
BY TECHNICAL COLLEGE STUDENTS FOR SUSTAINABLE
DEVELOPMENT IN ONDO AND EDO STATES, NIGERIA.**

Ogbebor Samuel Osamede

+234-8078180039

ogbebor@aauekpoma.edu.ng

&

Dr. (Mrs.) Jane ItohanOviawe

+234-8055601983

janeoviaw@aauekpoma.edu.ng

Department of Vocational and Technical Education
Faculty of Education, Ambrose Alli University (AAU).

Abstract

The study identified electrical engineering trade skills required by technical college students for sustainable development in Ondo and Edo States, Nigeria. A descriptive survey research design was adopted for the study. Two research questions guided the study and two null hypotheses were formulated and tested at .05 level of significance. The population for the study consisted of 405 respondents, 340 electrical engineering trade industrial workers and 65 electrical engineering trade teachers in the two States Ondo and Edo. There was no sampling because of the manageable size of the population. The instrument used for data collection was a 60- item questionnaire adapted from (Oviawe&Anaele, 2020) to suit the study. The instrument was validated by three research experts, two from the Department of Vocational and Technical Education Ambrose Alli University, Ekpoma and one in Measurement and Evaluation University of Benin, Benin City both in Edo State. Cronbach alpha reliability was used to determine the reliability of the instrument and a reliability coefficient of 0.79 was obtained. The data collected for this study was analyzed using Mean and t- test. The findings revealed that all the items were required by graduates for employment and sustainable development in Ondo and Edo States, Nigeria. Based on the findings of this study, it was recommended that all skills identified in this study be integrated in electrical engineering trade programme.

Keywords: Electrical engineering trade, Sustainable development, Technical colleges, Training skills.

Introduction.

Technical colleges, also known as technical schools or technical institutes, offer specialized training that prepare students for a specific career or trade. These institutions/colleges were founded by the Federal Government of Nigeria to give people the practical skills, fundamental scientific knowledge, and attitude that will enable them to live successfully in the community. Technical colleges, according to Omeje, et al (2019), are trade-based vocational institutions with clusters of occupations that are created to offer the technical skills needed to enter the workforce as craftsmen. According to Umar cited in Asogwa, et al (2022), technical colleges are post-primary institutions where students are required to have knowledge and abilities relevant to a variety of trades. Building trades, beauty culture trades, computer craft practices, painting, wood work trades, printing trades, textile trades, hospitality trades, mechanical trades, and electrical engineering trades are among the trades

taught in technical colleges, according the Federal Republic of Nigeria's National Policy on Education (FRN, 2013)

However, there are various areas of specialization for electrical engineering trades as they are given in technical colleges in compliance with the National Policy on Education. The National Board for Technical Education Program (NBTE, 2012) states that electrical engineering offers trade in the maintenance and repair of appliances, instrument repair, radio, television, and electronics work, as well as electrical installation and maintenance work. Given the aforementioned, electrical engineering trade, plays a crucial function in providing graduates with exceptional capabilities for using modern electrical technical devices. According to Ogwa (2015), the goals of the electrical engineering trade are to provide technical college students with the necessary training and abilities to enable them to acquire employment in recognized organizations, create jobs, or become financially independent. According to Onoh and Onyebuenyi (2017), an individual who chooses to pursue a career in electrical engineering trade will also be given the necessary practical and marketable knowledge, abilities, and values to work in an environment where electrical work is required. As a result, Okolie, et al (2019) underlined the following objectives for the electrical engineering trade:

1. To enable persons with desired knowledge, abilities, and values to carry out a specific duty in the electrical engineering trade so that they can become independent after graduation.
2. To give people the tools they need to develop their brain and make wise decisions in all facets of life.
3. To fulfill the desire of the graduate at this level to pursue higher-level vocational training and upgrade his occupation.

Electrical engineering trade, according to Ogwa and Nnachi (2016), offers technical training to fulfill both the needs of the individual and the demands of the electrical industry, enabling students to determine their career goals, through the use of good teaching techniques and instructional materials, these goals could be achieved. Industrial-based workers in the electrical engineering trade include electricians, electrical engineers, and technicians. They are responsible for designing, installing, and maintaining electrical systems in industrial settings. This includes power generation and distribution systems, control systems, lighting systems, and more. These workers have a thorough understanding of electrical theory and are able to apply it in practical settings. They are also familiar with the relevant regulations and safety standards.

According to Owo and Deebom (2020), employment includes any work done for income or recompense. It may take the form of a paid job in which one works for pay or a salary, paid in cash or in kind, or it may involve people who work for profit or family advantage, paid in cash or in kind. There seem to be a severe lack of work prospects in government and the organized commercial sector, which is made worse by the growing population and the current economic climate. However, graduates from educational institutions flood the labor market on a yearly basis. The majority of these graduates are neither hired nor self-employed despite having the aptitude, skills, and competence to work.

A person's capacity to regulate certain aspects of their behavior, thinking, and feelings in particular circumstances and task domains is referred to as their skills (Michael, cited in Oviawe & Anaele, 2020). Skills can be categorized as either general or technical by Saue (2020). He defined technical skills as the job-readiness abilities that prepare the graduate for employment in a profession, whereas general skills are inclined to no one profession but are necessary for an employee to perform properly. Technical skills are described by Edokoplor

and Owenbiugie (2017), as industry-specific talents needed for the creation of goods and services. According to researchers, skill development will raise people's living standards and lead to the creation of jobs. In order to overcome the scourges of hunger, poverty, inequality, and unemployment by the year 2030, the Sustainable Development Goals (SDGs) 2016–2030 were created.

World leaders accepted the 2030 agenda for sustainable development, which includes a list of seventeen Sustainable Development Goals (SDGs), at the United Nations Sustainable Development Summit on September 25, 2015. The three major goals of the SDGs are to end poverty, combat inequality and injustice, and combat climate change by 2030, which is stated as a road map to an inclusive, sustainable, and resilient development (Clark cited in Matthew & Emmanuel, 2019). The Sustainable Development Goals (SDG), also referred to as global goals, were created to fully implement the Millennium Development Goals (MDGs). Assuring comprehensive and equitable access to high-quality education and fostering opportunities for lifelong learning for all are two of the Sustainable Development Goals (SDGs) (Goal 4) listed by the United Nations Development Program (UNDP). The precise aims for this purpose (4.4 and 4.7), which serve as the foundation for this article, are, among other things:

- i. By 2030, double the number of young people and adults with the necessary skills, including technical and vocational ones, to find employment, create jobs, and become self-employ.
- ii. By 2030, make sure that all students have the knowledge and abilities necessary to advance sustainable development, including, but not limited to, education for sustainable development and sustainable lifestyles, human rights, gender equality, fostering a culture of peace and nonviolence, promoting global citizenship, and valuing cultural diversity and its contribution to sustainable development.

In both targets of the fourth SDG, skills acquired through education future prominently as a key concept that could drive all other attainments reflected in the two targets, because the role of education has been identified as critical to its success (Obe, Johnson, Buckland, Brookes & White, cited in Matthew & Emmanuel, 2019). In other words, it is through the acquisition of relevant skills that one could be gainfully employed, have decent jobs and entrepreneurship, promote sustainable development and attain sustainable life-styles, etc.

According to the World Commission on Environment and Development, cited in Edokpolor and Owenbiugie (2017), sustainable development is defined as addressing the requirements of the present without compromising the capacity of future generations to meet their own needs. It is a continual process with goals in mind that is comprehensive, long-term, and synergistic with effects on many facets of life. According to Nwosu and Micah (2017), sustainable development is a progressive and dynamic approach to addressing the needs and opportunities of the present without impairing or jeopardizing the integrity of the environmental factors that contributed to the enabling environment, thereby enabling the ability to address the needs, opportunities, and challenges of the future.

According to Edokpolor and Owenbiugie (2017), sustainable development of the Nigerian economy can be defined as a pattern of development that enables future generations to have access to the necessities of life, such as food, protection, healthcare, clothing, and shelter, as well as the current generation to have access to at least a high standard of living, self-esteem, and freedom. Education for Sustainable Development (ESD), according to UNESCO (2017), aids people in acquiring the information, abilities, attitudes, and behaviors necessary for sustainability. Promoting ESD in education is thought to be essential for creating a sustainable future and for putting children and young adults at the center of

development. The Federal Republic of Nigeria (FRN) developed technical colleges to produce graduates who will be employable in the workforce after realizing the significance and necessity for a sustainable industrial and technology workforce. In order to establish electrical engineering's trade suitability for having a specialized workforce, particularly at the craft level with job skills, it becomes appropriate to determine the required trade skills.

Statement of the Problem

Concerns have been raised that the teaching in technical colleges is not having the desired impact of ensuring a well-rounded education in terms of knowledge, skills, techniques, and values needed to produce an individual who would have been well educated and equipped with the spirit of inquiry and intellectual manipulative skills that will enable the learner to generate jobs, create wealth, and eradicate poverty. The Nigeria Education Research and Development Council (NERDC) revised the technical college curriculum in 2007 to ensure that it met the requirements of the Millennium Development Goals (MDGs) and the National Economic Empowerment and Development Strategies (NEEDS). These will, among other things, encourage young people to learn and develop life skills as well as assist them in acquiring the fundamental knowledge and abilities required to meet modern societal needs.

According to Oviawe and Uwameiye (2018), there is a growing disparity between the technical colleges' skill training and the real skills needed for employment in different occupations. This suggests that there is a crucial component missing from the Nigerian technical college graduates. It is necessary to learn valuable skills for self-employment and sustainable development in the electrical engineering trade as a result of the review of the technical college curriculum in 2007 and the graduation of many students who have completed the reviewed curriculum in Ondo and Edo States, Nigeria.

Purpose of the Study

The general purpose of the study is to determine the electrical engineering trade skills required by Technical College students for self-employment and sustainable development in Ondo and Edo States. Specifically, the study determined:

1. The general skills required by electrical engineering trade students of Technical Colleges for self-employment and sustainable development in Ondo and Edo States.
2. The technical skills required by electrical engineering trade students of Technical College for self-employment and sustainable development in Ondo and Edo States.

Research Questions

The following research questions guided the study:

1. What are the general skills required by electrical engineering trade students of Technical Colleges for self-employment and sustainable development in Ondo and Edo States?
2. What are the technical skills required by electrical engineering trade students of Technical Colleges for self-employment and sustainable development in Ondo and Edo States.

Hypotheses

The following null hypotheses were tested at .05 level of significance:

1. There is no significant difference in the mean responses of teachers and industry-based workers on the general skills required by electrical engineering trade students of Technical Colleges for self-employment and sustainable development.

2. There is no significant difference in the mean responses of teachers and industry-based workers on the technical skills required by electrical engineering trade students of Technical Colleges for self-employment and sustainable development.

Methodology

The study adopted the descriptive survey research design. The study was conducted in Ondo and Edo States, Nigeria comprising of 9 technical colleges. The population for this study consists of 405 respondents made up of 340 industrial- based workers of electrical engineering trade from all the 56 electrical engineering trade companies registered with the Ministry of Commerce and Industry and 65 electrical engineering trade teachers from nine NBTE accredited government technical colleges in Ondo and Edo states, Nigeria. Due to the manageable size of the population, there was no sampling. The entire population was used in the study. The instrument used for data collection in this study was 60-item questionnaire adapted from (Oviawe&Anaele, 2020) questionnaire. The original (Oviawe&Anaele, 2020) instrument contained 91 items but some questions were removed or alter to meet the status of the study. The questionnaire was structured on a five points Likert type scale of: Very Highly Required (VHR) – 5; Highly Required (HR) – 4; Required (R) -3; Moderately Required (MN) -2; and Not Required (NR) -1. The instrument was subjected to face validation by three experts, two from the Department of Vocational and Technical Education Ambrose Alli University, Ekpoma and one in Measurement and Evaluation University of Benin, Benin City both in Edo State. The suggestions and corrections of the experts were used to produce the final version of the instrument used for this study. Cronbach Alpha was used to establish the internal consistency of the items in the instrument. The reliability index of 0.79 was obtained. The instrument was administered by the researcher and seven other research assistants. 401 copies of the questionnaire were duly completed and returned after two weeks. This gave 97.5% return rate. Mean statistic was used to answer the research questions while the t-test was used to test the null hypothesis at 0.05 level of significance. Any item with a mean value of 3.00 and above was regarded as required while any item with a mean value below 3.00 was regarded as not required. Using the t-test statistic, the null hypothesis was rejected when the t-calculated value was greater than the t-critical sssvalue but retained when the calculated value is less than t-critical value of 1.96.

Results

Table 1: Mean Ratings and t-test of Responses of Teachers and Industry-Based Workers of Electric Engineering Trade on the General Skills Required for Self-employment and Sustainable Development.

S/N	General Skills Ability to:	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_t$	SD_t	t-cal	Sig(2-Railed Rmks)	RQ	Ho
1.	Solve problem intuitively	4.58	.71	4.37	.40	4.37	.67	.64	.48	HR	NS
2.	Initiate new ideas	4.46	.84	4.56	.92	4.48	.87	.47	.61	HR	NS
3.	Motivate others for assign task	4.57	.58	4.78	.60	4.56	.60	.70	.98	HR	NS
4.	Solve assign task timely	4.47	.75	4.58	.76	4.39	.74	.09	.94	HR	NS
5.	Achieve goal Expectation	4.52	.86	4.43	.97	4.38	.86	.38	.75	HR	NS
6.	Evaluate ideas	4.62	.68	4.63	.79	4.48	.62	.28	.69	HR	NS

7.	Seek opinion of others	4.39	.74	4.73	.74	4.37	.74	.09	.93	HR	NS
8.	Learn new things	4.41	.66	4.42	.66	4.31	.67	.23	.81	HR	NS
9.	Study in details	4.52	.51	4.22	.69	4.48	.51	.50	.61	HR	NS
10.	Write electrical Estimate	4.52	.51	4.22	.69	4.57	.51	.50	.61	HR	NS
11.	Relate with Customer risk	4.62	.71	4.53	.72	4.82	.67	.62	.72	HR	NS
12.	Procure materials	4.52	.86	4.45	.89	4.41	.82	.57	.84	HR	NS
13.	Use material Effectively	4.37	.57	4.57	.67	4.38	.75	.09	.92	HR	NS
14.	Be enthusiastic	4.36	.83	4.35	.85	4.34	.84	.82	.87	HR	NS
15.	Work without Supervision	4.43	.87	4.46	.90	4.41	.82	.89	.86	HR	NS
16.	lead other to Achieve task	4.61	.68	4.55	.71	4.52	.64	.80	.82	HR	NS
17.	Adapt to new Situation	4.72	.74	4.69	.79	4.61	.72	.80	.81	HR	NS
18.	Be resourceful	4.41	.63	4.44	.65	4.34	.62	.81	.82	HR	NS
19.	Deal with Pressure	4.53	.72	4.61	.71	4.51	.71	.61	.63	HR	NS
20.	Use ICT skills	4.71	.72	4.69	.74	4.63	.57	.71	.74	HR	NS
	Grand $\bar{x}$ and SD					4.67	.79				

Note: X_t =Total mean; SD_t = Standard deviation total; X_1 = mean of teachers; SD_1 = Standard deviation of teachers; X_2 = mean of industry-workers SD_2 =Standard deviation of industry-workers; N_1 = Number of teachers (65); N_2 = Number of industry workers (340).

Table 1 revealed that all the 20 items had their mean values ranging from 4.22 to 4.72, which were above the criterion mean of 3.00 indicated that the respondents agreed that all the 20 items are general skills required by students of Technical Colleges for employment and sustainable development. The grand mean of 4.67 with standard deviation of .79 suggested that skills in most of the items were perceived as highly required by electrical engineering trade students of Technical College for employment and sustainable development in Ondo and Edo States. The t-calculated values of all the items ranged .03 to .89 were lower than the t-critical value of 1.96 at an alpha level of .05.

Table 2: Mean Ratings and t-test of Responses of Teachers and Industrial workers of Electrical Engineering Trade on the Technical Skills required for Employment and Sustainable development

S/N	General Skills Ability to:	$\bar{X}_1$	SD_1	$\bar{X}_2$	SD_2	$\bar{X}_t$	SD_t	t-cal	Sig(2-Railed Rmks)	RQ	Ho
1.	Identify tools	4.27	.57	4.27	.49	4.28	.54	.69	.59	HR	NS
2.	Identify materials	3.90	.43	3.88	.61	3.89	.52	.35	.23	HR	NS
3.	Observe safety	4.22	.69	4.23	.68	4.13	.67	.72	.57	HR	NS
4.	Precautions to Prevent accident	4.43	.59	4.44	.59	4.41	.57	.82	.59	HR	NS
5.	Apply first aid	4.28	.57	4.43	.55	4.35	.55	.72	.62	HR	NS
6.	Identify safety	4.48	.75	4.49	.72	4.45	.72	.82	.92	HR	NS

	Use of tools											
7.	Use safety devices	4.75	.83	4.74	.83	4.72	.81	.84	.87	HR	NS	
8.	Use electrical Instrument	3.76	.49	3.91	.62	3.85	.50	.36	.24	HR	NS	
9.	Climb Ladder	4.87	.67	4.91	.71	4.82	.61	.74	.82	HR	NS	
10.	Climb Ceiling	4.56	.75	4.60	.76	4.42	.73	.77	.89	HR	NS	
11.	To peel electric Cable using piler	3.70	.50	3.78	.49	3.62	.45	.51	.72	HR	NS	
12.	To use knife to Peel cable	4.83	.77	4.86	.77	4.32	.72	.79	.71	HR	NS	
13.	twist cable together	4.83	.77	4.86	.77	4.81	.75	.79	.71	HR	NS	
14.	To nut cable to Material	4.31	.67	4.42	.58	4.27	.62	.56	.59	HR	NS	
15.	Handle materials Appropriately	4.29	.72	4.44	.69	4.43	.71	.72	.82	HR	NS	
16.	Chop the wall Appropriately	4.22	1.11	4.76	1.14	4.45	1.13	.32	.51	HR	NS	
17.	Buried conduit pipes	4.40	.70	4.42	.58	4.39	.69	.57	.60	HR	NS	
18.	Use complier to join Pipes	4.92	.78	4.91	.77	4.67	.79	.72	.81	HR	NS	
19.	Bend conduit pipes Appropriately	4.38	.73	4.52	.61	4.45	.60	.78	.85	HR	NS	
20.	Connect pipe to M k box.	4.39	.72	4.41	.53	4.41	.67	.67	.70	HR	NS	
	Grand X and SD					4.72	.82					

In response to research question 2, Table 2 revealed that all the 20 items had their cluster mean values ranging from 3.33 to 4.91, which were above the criterion mean of 3.00 indicated that the respondents agreed that all the 20 items are technical skills required by electrical engineering trade students of Technical College for employment and sustainable development. The grand mean of 4.72 with standard deviation of .82 revealed that students of the electrical engineering trade at Technical College believed that the technical abilities in majority of the items were required for employment and sustainable development in Ondo and Edo States.

Discussion of Finding.

The outcome in Table 1, therefore showed that there were no significant differences between the mean response of the two groups of respondents. Therefore, it was determined that there were no significant differences between the mean replies of teachers and industrial-workers in the electrical engineering trade on the general skills needed by technical college students for sustainable development and employment, it therefore means the all the skills are require for employment and sustainable development. According to Matthew and Emmanuel's (2019) study on encouraging the acquisition of science skills for empowerment and sustainable development, technical college graduates need fundamental general skills in order to find employment and have an influence in developing countries. Similar to this, Edokpolor and Owenvbiugie (2017) noted that general skills are also crucial in their study on technical and

vocational education and training skills: An antidote for Job creation and sustainable development of Nigeria's economy. Solve problem intuitively, initiate new ideas, motivate others for assign task, are a few of the skills students need to develop. This suggests that in order to increase their employability, students of technical colleges are expected to respect and comprehend the feelings of both their clients and co-workers.

The findings of this study in Table 2 revealed that there are 20 technical skills required by students of technical college electrical engineering trade for employment and sustainable development. This result is consistent with (Asogwa, et al., 2022) who conducted a study on the technical expertise of building technology graduates of technical colleges in Enugu state, Nigeria, and reported that building construction students in technical colleges needed safety practice skills in using hand tools, such as hawk for holding mortar, builder square, measuring tape, tingle plate, spirit level, cold chisel, masons saw, etc. Legg-Jack and Ndebele's study from 2022, which examined the importance of industry stakeholder partnerships in the development of skilled electrical engineering trade students, lends support to the study's findings. They found that graduates of technical colleges require domestic installation skills, industrial installation skills, cable jointing skills, battery charging skills, and winding skills in electrical machines in order to find employment in Ondo State. The findings of this study are also supported by Oviawe and Uwameiye (2018), who conducted research on the work skills requirements and job performance of graduates of technical colleges' block laying and concreting works trades for employment in South-South, Nigeria. They discovered that graduates of technical colleges required training in preliminary skills, manual block production, manual mixing of mortar, manual laying of bonds up to lintel level, cavity construction, and other skills the technical college graduates could not carry out the competency items to the level needed in block laying and concreting works; and the construction of a semi-circular arch using bricks, rendering walls, and wall tiling. The results of this study are also in collaboration with those of Ibeneme and Ebubechi (2021), who conducted a study on the practical skills needs of Technical College graduates of Motor Vehicle Mechanic Work (MVMW) for employment in Anambra and Enugu State and found that all the stipulated practical skills are highly needed by MVMW graduates for employment in Anambra and Enugu States. This has the implication that some technical college graduates may not have received the necessary training for long-term employment. The conclusion of this study is consistent with that of Oviawe and Anaele (2020), who found that students needed all of the required skills in order to find employment, create job and contribute to sustainable development.

Conclusion

According to the findings of this study, students of the electrical engineering trade in Nigeria need general and technical skills in all the trade where technical college graduates are needed for job creation, employment and sustainable development.

Recommendations

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

1. Students in technical colleges should emphasize and learn general skills.
2. All trade subjects at technical college should expose students to sufficient technical skill activities.
3. The technical college curriculum should be evaluated on a regular basis to suit the demands of the evolving workplace.

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