ELECTRICAL INSTALLATION AND MAINTENANCE SKILL NEEDS OF TECHNICAL COLLEGE GRADUATES FOR JOB CREATION AND SELF-RELIANCE IN ENUGU STATE

BY

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Abstract
The acquisition of skills especially in electrical installation and maintenance trades will undoubtably lead to job creation and self-reliance as lack of employment is an evidence of unsaleable skills possessed by technical college graduates. This study was conducted to determine the electrical installation and maintenance skill needs of technical college graduates for job creation and self-reliance in Enugu State. The population for the study comprised of 33 graduates in rural and 64 graduates in urban cities of Enugu state. Due to manageable size of the population, there was no sampling. Two research questions were raised and answered using mean and standard deviation while hypotheses formulated were tested using t-test at .05 level of significance. The study adopted descriptive (survey) research design while data was collected using a structured questionnaire developed by the researcher. The instrument was validated by three experts; the reliability of the instrument was established using Cronbach Alpha which gave a high co-efficient result of 0.78. Some of the findings include: electrical installation and maintenance work skills like Planing the layout and installation of wiring, Testing of electrical work for safety, Competence with tools, effectives use of materials, inspection of electrical installation, interpretation of wiring drawing and the likes are highly needed for job creation. It was therefore recommended amongst others that all the identified skills should be integrated into the curriculum of technical colleges for training of students; Government should endeavour to finance and equip technical college workshops as to encourage more training and equipment of students with necessary skills for job creation and self reliance upon graduation in Enugu State.

Introduction

Learning is the process of acquisition of knowledge (practical and theoretical) which is one of the goals of education. According to Federal Republic of Nigeria (2013), one of the goals of education is the acquisition of appropriate skills and development of mental, physical, social abilities, competencies and as well the preparation for the individual to live and contribute to the development of his society. In Nigeria,

technical education is the programme given the mandate to produce craftsman or middle level manpower that will acquire practical skills in the utilization of technological devices through technical college (FRN, 2008).

In the same vein, Nwachukwu, Bakare and Jika (2011) submit that technical college provides students through training with the relevant and adequate knowledge, skills and attribute for employment under the guidelines of a teacher in related occupations. The place of skill acquisition in technical education can not be over-emphasized and to achieve these objectives, too many trades are learnt in technical colleges. Ede, Miller and Bakare (2010) identified that students undertaking technical education programmes are trained in auto-mechanics, wood-work, plumbing, computer craft, mechanical trades, radio, television (RTV) and electronics works, electrical installation and maintenance works. With focus on electrical/electronic (E/E) trade, Electrical/electronics trade is vital in the production of workforce with understanding in diverse skills in the design, development, production, management and utilization of trending electrical/electronics devices and circuits. According to Republic of South Africa (2008), electrical/electronic trade focuses on the application and understanding of principles and technological process inherent in the application/production of electrical/electronic products and system in order to improve the quality of life. In view of the National Board for Technical Education programme (NBTE, 2012) electrical/electronics offers trade in;

Appliance maintenance and repairs
Electrical installation and maintenance works
Instrument mechanics
Radio, television (RTV) and maintenance works.

In the light of the above, electrical installation and maintenance works as offered in technical college prepares an individual with job-satisfying requirements towards employment and self-reliance. Electrical installation and maintenance work provides technical training to meet the demands of electrical industry and the needs of the individual allowing the students to identify their career objectives (Ogwa 2016). Skill is the ability to do something well, usually gained through training or experience. Skill acquisition in electrical installation and maintenance works employs measures and develops jobs in electrical installation geared towards making students confident and self-reliant (Ngwoke, 2006). Electrical installation and maintenance works curriculum is designed to prepare the students to acquire entry level knowledge and manipulative skills for employment in the electrical industry in Nigeria and Enugu State in particular. Students who undergo training in Electrical installation trades as expected to posses skills for excellence in installation of electrical machines and equipment, maintain nerve of machines and equipment, winding of electrical machines, testing and inspection of electrical installations, repair of electrical machine e.t.c. . Enugu State is one of the States located at the South-Eastern part of Nigeria with a population of over one million according to year 2015 estimate who utilizes electrical electronic products that requires installation and maintenance skills (https://en.m.wikipedia.org/wiki/Enugu).

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Statement of problem

Electrical installation and maintenance works taught in technical colleges are poised with potentials of equipping the students with prerequisite skills to propel them contribute meaningfully to national economic development, be self-reliant and job creators towards reduction of unemployment. Nevertheless, most electrical installation and maintenance works graduates roam the street unemployed because they can not get employed or establish their own business due to the fact that they lack saleable skills which may be as a result of ill training or inadequate skill acquisition amongst graduates of electrical installation and maintenance work. Hence there is need for identification and integration of relevant skills needed in electrical installation and maintenance works into technical college curriculum for job creation and self-reliance in Enugu State.

Purpose of the study

The main purpose of this study was to determine the electrical installation and maintenance skill needs of technical college graduates for job creation and self-reliance in Enugu State, but the study specifically sought to identify;

1. electrical installation skill needs of technical college graduates for job creation and self-reliance in Enugu State
2. electrical maintenance skill needs of technical college graduates for job creation and self reliance in Enugu State

Research questions

The following research questions guided the study:-

1. What are that electrical installation skill needs of technical college graduates for job creation and self-reliance?
2. What are the electrical maintenance skill needs of technical college graduates for job creation and self-reliance?

Hypotheses

1. The following null hypotheses formulated and tested at .05 level of significance guided the study;
2. $H0_1$: There is no significant difference between the mean ratings of technical college graduates in the rural areas and those in the urban areas on electrical installation skill needs for job creation and self-reliance in Enugu State
3. $H0_2$: There is no significant difference between the mean ratings of technical college graduates in the rural areas and those in the urban areas on electrical maintenance skill needs for job creation and self reliance in Enugu State.

Research methods

The study adopted survey research design. A survey research design is one which involves the assessment of public opinion using questionnaire and sampling methods (Alio 2008). The study was carried out in Enugu state covering Enugu South, Nkanu West and Nkanu East Local Government Areas particularly. The population of the study comprised of 33 graduates in Enugu rural and 64 graduates sampled purposively in Enugu urban cities. The entire population was used as the population size was manageable. Data was collected using a structured four point weighted 31-item questionnaire developed by the researcher. The response options were Very Highly Needed (VHN), Highly Needed (HN), Needed (N) and Less

According to https://en.m.wikipedia.org/wiki/Electrical_installation, electrical installation and maintenance works trade is a programme introduced by way of practical exercise, the maintenance of electrical system and circuits. In view of above, National Board for Technical Education (NBTE, 2004) maintained that electrical installation craftsmen are expected to test, diagnose, service, install and completely repair any fault on electrical machines and equipment using the manufacturer's manual. A well trained electrical installation and maintenance worker will be capable of designing, installing, repairing or maintaining electrical work systems in industries and residential buildings. Ekwe (2009) opined that technical college students require competent hands, adequate facilities and practical work experience towards effective skills acquisition in electrical trades to strive towards job creation self-reliance and self dependent. Self reliance is the capacity of being the boss of oneself which is as a result of saleable skills for proper adaptation to the world of work that would subsequently enhance poverty reduction. Ogwa (2015) noted that the objectives of electrical installation and maintenance works trade is to give training and impact needed skills to technical college students in that area to enable them secure employment in recoganized organisation, create job or become self-reliant economically. Electrical installation trade also equips an individual with functional and saleable skills, knowledge and attitude or value that would enable them operates in rendering service in electrical related institution or work. Consequently, the goals of electrical installation trade include:

Table 1: Mean and Standard Deviation of electrical installation skill needs of technical college graduates for job creation and self-reliance in Enugu State?

S/N	Electrical installation skills needs of technical college graduates for job creation and self-reliance are	Rural (33)			Urban (64)			Overall		
		$\overline{X}$	SD	D	$\overline{X}$	SD	D	$\overline{X}$	SD	D
1	Plan the layout and installation of wiring	1.96	1.34	N	3.37	0.48	HN	2.67	0.91	HN
2	Test electrical work for safety	3.64	0.68	VHN	2.83	0.32	HN	3.24	0.5	HN
3	Competence with tools	1.43	1.07	LN	2.13	0.98	N	1.78	1.01	N
4	Effectives use of materials	1.96	1.34	N	3.37	0.48	HN	2.67	0.91	HN
5	Inspection of electrical installation	2.63	1.08	HN	2.33	1.06	N	2.48	1.7	N
6	Interpretation of wiring drawing	2.70	1.03	HN	2.87	0.67	HN	2.79	0.85	HN
7	Verification of electrical installation	2.34	0.49	N	2.20	1.35	N	2.27	0.92	N
8	Measuring and marking out	3.63	0.48	VHN	2.33	1.40	N	2.98	0.94	HN

9	Testing of electrical installation	3.41	0.66	HN	3.56	1.65	VHN	3.49	1.16	HN
10	Correct functioning of electrical circulatory	2.51	1.43	HN	2.41	0.78	N	2.46	1.11	N
11	Safety	3.36	0.47	HN	3.33	0.87	HN	3.35	0.67	HN
12	Compliance with statutory/safety regulation	3.11	0.82	HN	3.67	1.05	VHN	3.39	0.94	HN
13	Interpretation of installation details	2.66	1.10	HN	2.56	1.28	HN	2.61	1.19	HN
	GRAND MEAN/PULL SD	**2.71**	**0.92**	**HN**	**2.61**	**0.95**	**HN**	**2.78**	**0.96**	**HN**

Highly Needed (HN), Needed (N)

The result in table 1 above showed that items 1,2,4,6,8,9,11,12 & 13 with mean scores of 2.67,3.24,2.67,2.97,2.98, 3.49, 3.35, 3.39 & 2.61 are highly needed while 3,5,7 & 10 with mean scores of 1.78,2.27 & 2.46 are needed for job creation and self reliance of technical college graduates in Enugu. However, the grand mean of 2.78 suggests that installations skills are highly needed for job creation and self reliance. The pull standard deviation of 0.96 shows that their opinions are the same.

Research Question 2

What are the electrical maintenance skills needs of technical college graduates for job creation and self-reliance in Enugu State?

Table 2: Mean and Standard Deviation of electrical maintenance skill needs of technical college graduates for job creation and self-reliance in Enugu State.

S/N	Electrical maintenance skills needs of technical college graduates for job creation and self-reliance are:	Rural (33)			Urban (64)			Overall		
		$\overline{X}$	SD	D	$\overline{X}$	SD	D	$\overline{X}$	SD	D
14	Forecasting of spare parts	3.04	0.69	HN	3.45	0.62	HN	3.25	0.66	HN
15	Analysis of repetitive equipment failure	2.51	1.12	HN	3.47	0.45	HN	3.00	0.79	HN
16	Assume optimization of the maintenance organization structure	2.13	0.18	N	1.73	1.22	N	1.93	0.70	N
17	Estimation of maintenance costs	2.13	0.64	N	3.34	0.43	HN	2.79	0.54	HN
18	Evaluation of alternatives	2.04	0.63	N	1.43	0.89	HN	1.76	0.76	N
19	Establishments of replacement programme when due	2.29	0.64	N	2.74	1.21	HN	2.52	0.93	HN
20	Assessing needs for equipment replacements	2.14	0.07	N	3.48	0.48	HN	2.81	0.23	HN
21	Application of project management principles	2.96	0.17	HN	3.51	0.57	VHN	2.90	0.64	HN

22	Application of scheduling principles to replacement programme	3.27	0.83	HN	2.43	0.45	HN	2.85	0.64	HN
23	Assessing required maintenance tools	2.78	0.51	HN	1.93	0.65	N	2.36	0.58	N
24	Assessing safety hazards	3.23	0.65	HN	2.48	0.61	N	2.86	0.63	HN
25	Reporting safety hazards associated with maintenances of equipment	3.19	0.68	HN	3.44	0.48	HN	3.32	0.58	HN
26	Practice safe working methods of electrical systems	2.14	0.86	N	2.00	0.50	N	2.07	0.68	N
27	Use electrical test equipment effectively	3.20	0.81	HN	3.11	0.27	HN	3.16	0.54	N
28	Identify motor and power circuit faults	2.05	0.62	N	1.61	0.45	N	1.83	0.54	N
29	Use circuit diagram as an aid to maintenance	2.64	0.61	HN	2.78	0.64	HN	2.71	0.63	HN
30	Diagnoses basic faults and recognize the associated signs	2.86	0.63	HN	3.01	1.11	HN	2.94	0.87	HN
31	Understand the basic regula tory requirements	2.96	0.50	HN	3.81	1.04	VHN	3.39	0.77	HN
	GRAND MEAN/ PULL SD	**2.64**	**0.60**	**HN**	**3.0**	**0.67**	**HN**	**2.69**	**0.65**	**HN**

Highly Needed (HN), Needed (N)

The result in Table 2 showed that maintenance skills in items 14, 15, 17, 19, 20, 21, 22, 24, 25, 27, 29, 30 & 31 with mean scores of 3.25, 3.00, 2.79, 2.52, 2.81, 2.90, 2.85, 2.86, 3.32, 3.16, 2.71, 2.94 & 3.39 are highly needed while 16, 18, 23 & 26 with mean scores of 1.93, 1.76, 2.36, 2.07 & 1.83 are needed for job creation and self reliance of technical college graduates in Enugu. However, the grand mean of 2.69 suggests that the maintenance skills are highly needed for job creation and self reliance. The pull standard deviation of 0.65 shows that their opinions are the same.

Hypotheses

$H0_1$: There is no significant difference between the mean ratings of technical college graduates in the rural areas and those in the urban areas on electrical installation skill needs for job creation and self-reliance in Enugu State

Table 3: t-test analysis between technical college graduates in the rural areas and those in the urban on electrical installation skill needs for job creation and self reliance in Enugu State.

Respondents	No	$\bar{X}$	SD	Df	Level of signi	T.Crit	T.Cal	decision
Techn. In Rural	33	2.71	0.92	95	0.05	2.000	0.48	NS
Techn. In Urban	64	2.61	0.95					
Total	97							

NS = Not significant.

The t-test result above shows that t-cal (0.48) is less than t-critical (2.000) at 95 degree of freedom. Therefore since the T-cal is less than T-critical, the null hypothesis is not rejected. This implies that is no significant difference in the mean ratings of technical college graduates in the rural and urban areas on electrical installation skills needs for job creation and self-reliance in Enugu State.

$H0_2$: There is no significant difference between the mean ratings of technical college graduates in the rural areas and those in the urban areas on electrical maintenance skills needs for job creation and self reliance in Enugu State.

Table 4: t-test analysis between technical college graduates in the rural areas and those in the urban areas on electrical maintenance skills needs for job creation and self reliance in Enugu State.

Respondents	No	$\bar{X}$	SD	Df	Level of signi.	T.Crit	T.Cal	decision
Techn. In Rural	33	2.64	0.60	95	0.05	2.000	0.38	NS
Techn. In Urban	64	2.69	0.67					
Total	97							

NS = Not significant.

The t-test result above shows that t-cal (0.38) is less than t-critical (2.000) at 95 degree of freedom. Therefore since the T-cal is less than T-critical, the null hypothesis is not rejected. This implies that is no significant difference in the mean ratings of technical college graduates in the rural and urban areas on electrical maintenance skills needs for job creation and self-reliance in Enugu State.

Discussion

The study revealed that in research question 1, electrical installation work skills like ability to plan the layout and installation of wiring; Test electrical work for safety; Effectives use of materials; Interpretation of wiring drawing; Measuring and marking out and the likes are highly needed while skills like competence with tools; Inspection of electrical installation; Verification of electrical installation; Correct functioning of electrical circulatory are needed for job creation and self reliance. The t-test results (t-cal (0.48) is less than t-critical (2.000) at 95 degree of freedom) show that there is no significant difference in the mean ratings of technical college graduates in rural and urban cities on electrical installation work skills for job creation and self-reliance in Enugu State. This is in agreement with the findings of Akinduro (2006) who conducted a study on electrical installation and maintenance work skills needed by technical college graduates to enhance their employability in Ondo State.

Findings in Table 2 showed that maintenance skills like forecasting of spare parts, analysis of repetitive equipment failure, assessing needs for equipment replacements, application of scheduling principles to replacement programme, application of project management principles and the likes are highly needed while skills like ability to assume optimization of the maintenance

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Findings in Table 2 showed that maintenance skills like forecasting of spare parts, analysis of repetitive equipment failure, assessing needs for equipment replacements, application of scheduling principles to replacement programme, application of project management principles and the likes are highly needed while skills like ability to assume optimization of the maintenance organization structure, evaluation of alternatives, assessing required maintenance tools, practice safe working methods of electrical systems, use electrical test equipment effectively and ability to identify motor and power circuit faults are needed. The t-test result shows that t-cal (0.38) is less than t-critical (2.000) at 95 degree of freedom. This implies that is no significant difference in the mean ratings of technical college graduates in the rural areas and urban areas on electrical maintenance skills needs for job creation and self-reliance in Enugu State. Bakare (2006) investigated safety practice skills needed by electrical/electronics students of technical colleges in Ekiti State. It was found out that all the safety pratical skills identified are needed by electrical/electronics students for effective functioning in workshops. Similarities exists between the two studies and it was recommended that the safety practice skills identified should be incoporated into electrical/electronics curriculum of technical colleges.

Conclusion

Based on the findings of this study electrical installation and maintenance skills are prerequisite in the preparation of students for world of work. Both technical college graduates in rural and urban cities agree that all the electrical installation and maintenance work skills are needed for job creation and self reliance. Installation skills like Planing the layout and installation of wiring, Testing of electrical work for safety, Competence with tools, effectives use of materials, inspection of electrical installation, interpretation of wiring drawing and the likes are highly needed for job creation. Both technical college graduates in rural and urban cities also agree that electrical maintenance skills like diagnosing basic faults and recognize the associated signs, use electrical test equipment effectively,

understand the basic regulatory requirements in maintenance, use circuit diagram as an aid to maintenance, reporting safety hazards associated with maintenances of equipment and application of scheduling principles to replacement programme are needed by technical college graduates. It is believed that when these skills are taught, it would facilitate job creation and self reliance in Enugu state.

Recommendation

The following recommendations were made in view of the findings of the study.

1. Electrical installation and maintenance work skills should be encouraged by teachers for job creation and self reliance of technical college graduates in Enugu State.
2. All identified skills should be integrated into the curriculum of technical colleges by curriculum planners for training of students.
3. Government should endeavour to finance and equip technical college worksops as to encourage more training and equipment of students with necessary skills for job creation and self reliance upon graduation.

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