



Science Arena Publications
Specialty Journal of Electronic and Computer Sciences

ISSN: 2412-7485

Available online at www.sciarena.com

2019, Vol, 5 (4): 13-19

Electrical Installation of Buildings Skills Acquired by Graduates of Electrical Engineering Programme of Polytechnics in Bauchi and Yobe States, Nigeria

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Abstract: This study determined the electrical installation skills acquired by graduates of Electrical Engineering Technology Programme of Polytechnics in Bauchi and Yobe States. One research question and one null hypothesis guided the study. The study adopted a descriptive survey design. The population for the study comprised of seventy five (75) diploma graduates of electrical engineering programme from Polytechnics in Bauchi and Yobe States and thirty two (32) workplace-based supervisors. The instrument used for data collection was a structured questionnaire titled 'National Diploma Electrical Engineering Graduates Skills Acquired Questionnaire (NDEEGSAQ). The instrument was validated by three lecturers in the Department of Electrical Technology Education and later trial-tested on holders of National Diploma in Electrical Engineering currently in the employment of Yola Electricity Distribution Company and Adamawa State Water Board. Cronbach Alpha formula was used to determine the reliability index of the instrument which yielded 0.74. Data obtained was analysed using SPSS. Mean and standard deviation were used for answering the research question while z-test was used to test the hypothesis at 0.05 level of significance. Findings of the study revealed that graduates of Electrical Engineering Programme of Polytechnics moderately acquired skills in electrical installation. It was recommended among others that there should be emphasis on on-the-job training in order to improve the skills of the graduates for overall productivity.

Keywords: Electrical Installation; Skills; Graduates; Polytechnics; Bauchi; Yobe.

INTRODUCTION

The education and training of manpower for the overall development of industry in a nation depends on the effectiveness and efficiency of technical and vocational institutions in providing functional skills to graduates. Industrial organisations depend largely on the availability of manpower because according to Enemali (2006) manpower is the basic resource; it is the indispensable means of converting other resources to mankind's use and benefit. Technical and Vocational institutions in Nigeria include Technical Colleges, Polytechnics or Institutes of Technology, Monotechnics, Colleges of Education (Technical) and Universities.

Polytechnics are institutions where students acquire skills and training in different occupations for employment in the world of work. They offer courses leading to the award of National Diploma (ND) and Higher National Diploma (HND). One of the distinguishing features of Polytechnic Education is the strong emphasis on practical skills acquisition. Industrial work experience is included as part of the practical curriculum. This enables students to gain on-the-job experience. The National Board for Technical Education

(NBTE, 2009) maintains that Polytechnics shall, in addition to those general goals of tertiary education have as their specific goals, the following:-

- (a) Provide full-time or part-time courses of instruction and training in engineering, other technologies, applied science, business and management, leading to the production of trained manpower;
- (b) Provide the technical knowledge and skills necessary for agricultural, industrial, commercial, and economic development of Nigeria;
- (c) Give training and impart the necessary skills for the production of technicians, technologists and other skilled personnel who shall be enterprising and self-reliant;
- (d) Train people who can apply scientific knowledge to solve environmental problems for the convenience of man; and
- (e) Give exposure on professional studies in the technologies (FRN, 2009).

Polytechnics are technical and vocational education institutions in Nigeria that give training intended to prepare middle-level manpower needed for various occupations as technicians, technologists and other skilled personnel for industrial development.

As stated in the National Policy on Education, Polytechnics are to provide courses of instruction and training in engineering, technologies and so on. One of these engineering courses is electrical/electronic engineering. Polytechnics offering accredited programmes will award the National Diploma to candidates who successfully complete the programme after passing prescribed course work, examination, diploma project and supervised industrial work experience.

The school is the training ground for skill acquisition and every sector of the economy requires skill in order to function. Okorie as cited in Ogbuzuru (2011) defined skill as manual dexterity that is acquired through repetitive performance of an operation. Okorie further described skill as expertness, practical ability, dexterity and tact. Skill is, therefore, a well-established habit of doing something. Proctor and Dutta as cited in Jimah, Jimah and Ebele (2011) defined skill as “goal- directed, well-organized behavior that is acquired through practice and performed with economy of effort”. Aliozor as cited in Gimba (2011) defined skill acquisition as the process by which individuals are expected to learn and have continuous practice in particular task till the learner becomes proficient in the operation and can perform them when required.

Assessment is a generic term for a set of processes that measure the outcome of students’ learning in terms of knowledge acquired, understanding developed and skills or abilities gained. Assessment of acquired skills therefore refers to a set of processes that determines the level of skills acquired by graduates after partaking in a course of study. According to University of Ulster (2013), one of the purposes of assessment is that it enables the learners to obtain feedback on their learning, their strengths and weaknesses and helps them improve their performance. Since the purpose of vocational and technical education is to prepare students for employment in their chosen occupation therefore, ultimate assessment is often used to determine the extent to which the purpose of technical and vocational education has been achieved (Ezekiel, 2011). Okoro as cited in Gimba (2011) stated that, Vocational Education has remained uncoordinated, unplanned, inadequate and to a considerable extent irrelevant to providing skills, knowledge and attitudes needed for gainful employment, productivity and effective management in various occupations. According to Adebisi (2015), the Polytechnic education in Nigeria is established to impart the youths with practical and employable skills.

Regrettably however, contrary seems to be the situation. Teaming number of polytechnic graduates are unemployed and jobless. Several other studies have pointed out that graduates of technical institutions are lacking in practical skills against this background therefore, this study seeks to discover the views of graduates and their supervisors, on the state of practical skills acquired to meeting the socio-economic needs of the graduates of National Diploma Electrical Engineering Technology Programme of Polytechnics of Bauchi and Yobe states.

Statement of the Problem

The National Diploma Electrical Engineering programme in Polytechnics is aimed at producing skilled technicians who will be able to perform basic functions in electrical engineering works both in public and private sector. The programme is skill oriented whose graduates are expected to be self employed by establishing repair workshops or employed in industries. The reality however is that some of these young people end up working in poor conditions in the informal economy. It has been observed that the objectives of education and training in the Polytechnics have not been achieved over the years. This is due to lack of functional skills acquired by the students during training in the Polytechnics. Atsumbe (2009) observed that employers of labour or industrialists generally consider the products of technical institutions unusable without further training and that several of these graduates roam the streets without employment as a result of lack of skills. This point of view is supported by Chiemeké, Longe, Longe and Shaib (2009) who observed that employers complain that graduates are poorly prepared for work. Chiemeké *et al* (2009) believe that academic standards have fallen considerably over the past decade and that a university degree or a polytechnic diploma is no longer a guarantee of communication skills or technical competence. In addition, Akinyemi, Ofem and Ikuenomore (2012) observed that the issues of graduate unemployment and underemployment with their attendant consequences (such as increased crime rate, unfulfilled dreams, suicide, impaired financial position, etc.) are posing a great challenge to many developing countries of which Nigeria is one.

Bauchi and Yobe state youths in the North East geo-political zone of Nigeria are not exempted from any negative effect of unemployment. Rufai, Abdulkadir and Kagara (2013) reported that there are vacancies for jobs in Nigeria but right now there are little or no manpower with appropriate skills to fill the vacancies for the jobs. Ogundele (2013) assert that there are increasingly fewer occupational opportunities for the unfortunate youths who lack the basic skills and knowledge. By implication, unemployment rate will increase which will be a menace to the society, thereby, slowing down the pace of development because of untapped potentials or talents that are lying idle. Carrying out a study to determine the level of skills acquired by graduates of National Diploma Electrical Engineering Technology Programme of Polytechnics of Bauchi and Yobe States will help the graduates to obtain feedback on their learning, their strengths and weaknesses and improve their performance.

Purpose of the Study

The main purpose of the study was to determine the level of skills acquired by National Diploma Electrical Engineering programme graduates in Bauchi and Yobe States of Nigeria. Specifically, the study was to determine the level of skills acquired in:

1. Electrical Installation by National Diploma graduates of Electrical Engineering in Bauchi and Yobe States

Research Question

The study sought to answer the following research question to guide the study.

- 1 What is the level of skills acquired in Electrical Installation by National Diploma graduates of Electrical Engineering in Bauchi and Yobe States?

Hypothesis

The following null hypothesis was formulated and tested at 0.05 level of significance in the study.

- 1 H₀₁ There is no significant difference between the mean ratings of National Diploma graduates of Electrical Engineering and their supervisors on the skills acquired in Electrical Installation

Methodology

A descriptive survey research design was adopted for this study. The area of the study were Bauchi and Yobe States. The population of the study comprised of 75 Polytechnic National Diploma Electrical Engineering graduates and 32 Electrical Engineering Workplace-based supervisors that are currently working in the public sector in Bauchi and Yobe States. The entire population was adopted for the study and so there was no sample and sampling technique for this study. The instrument used for data collection for the study was a structured questionnaire developed by the researcher using NBTE (2007) Curriculum and Course Specification for National Diploma Electrical Engineering Technology Programme. The Instrument is titled 'Electrical Engineering Graduates Skills Acquired Questionnaire (EEGSAQ).' The respondents are National Diploma Electrical Engineering graduates and Electrical Works Supervisors at their workplaces. The instrument consisted of 13 items in all.

A five point rating scale was used to determine the level of skills acquired by responding to a number of practical tasks listed in the tables. The response mode of the instrument used were Very Highly Acquired, Highly Acquired, Moderately Acquired, Slightly Acquired, Not Acquired. The instrument was validated by three lecturers all from the Department of Electrical Technology Education, School of Technology and Science Education, Modibbo Adama University of Technology, Yola. The reliability of the instrument was determined by trial-testing the instrument on holders of National Diploma Electrical/Electronic Engineering Technology currently employed in Adamawa State Water Board and Electrical section of Works Department, Modibbo Adama University of Technology, Yola. In order to determine the internal consistency of the instrument, Cronbach Alpha (α) formula was used to determine the reliability coefficient of the instrument. The reliability index was calculated and was found to be 0.74. The instrument adopted by the researcher was distributed to the respondents and later retrieved with the help of some research assistants in the organisations where the research was being conducted. The research question was answered using the mean responses and standard deviation.

Mean scores were used to answer the research question. Z-test statistic was used to test the null hypothesis at 0.05 level of significance on mean opinions of the National Diploma Electrical Engineering Technology Programme graduates and their supervisors on the level of skills acquired in the practical tasks. The mean, standard deviation and mean of means statistics was used because data was collected from graduates and supervisors and z- test was used for testing differences existing between two separate means. The cut-off point (decision point) is 2.50 and above as acquired and any rating below 2.50 is considered not acquired. The decision to accept or reject a null hypothesis was based on the tabulated and calculated values of z. When the tabulated value also known as z critical ($z_{crit.}$) is greater than the calculated value (z_{cal}) the null hypothesis is accepted or otherwise rejected.

Result and Discussion

Research Question 1

The purpose of the study was to determine the level of skills acquired in:

Electrical Installation of Buildings by National Diploma graduates of Electrical Engineering in Bauchi and Yobe States. The research question in line with the specific purpose therefore goes like this; what is the level of skills acquired in Electrical Installation of Buildings by Diploma graduates of Electrical Engineering in Bauchi and Yobe States? The responses elicited from both the graduates and their supervisors were analyzed using mean, standard deviation and mean of means of the ratings of graduates and supervisor and presented on Table 1

Table 1: Mean Ratings of National Diploma Electrical/Electronic Engineering Graduates (NDEEG) and Electrical Works Supervisors (EWS) on level of Skills Acquired in Electrical Installation of Buildings

S/N	Item $n_1=75, n_2=32, n_t=107$	\bar{x}_1	\bar{x}_2	s_1	s_2	\bar{x}_g	Remark
1	Drawing electrical graphical symbols	4.15	3.69	0.92	1.04	4.01	A
2	Drawing electronic graphical symbols	3.92	3.59	0.75	0.97	3.82	A
3	Interpreting various electrical schematic diagrams	3.95	3.13	0.77	0.85	3.70	A
4	Interpreting various electronic schematic diagrams	3.68	2.84	0.62	0.70	3.42	A
5	Interpreting various electrical installation/wiring diagrams	4.09	3.50	0.87	1.04	3.91	A
6	Drawing architectural drafts of simple buildings e.g. 3-bedroom flat	3.40	2.59	0.50	0.72	3.16	A
7	Producing elevation drawings for architectural drawings	3.21	2.50	0.41	0.43	3.00	A
8	Drafting electrical services for a residential building e.g. 3-bedroom flat	3.68	3.63	0.61	0.91	3.67	A
9	Drafting electrical supply for a 3-bedroom building	3.80	3.66	0.67	0.99	3.76	A
10	Drawing the installation diagram for a Single phase energy meters in domestic premises	3.77	3.25	0.72	0.81	3.61	A
11	Drawing the installation diagram for a three-phase energy meters in commercial/industrial premises	3.65	3.16	0.60	0.88	3.50	A
12	Ability to carry out the inspection of conduit installation as required by the IEEE regulations	3.92	3.78	0.74	1.08	3.88	A
13	Ability to carry out the required test of the conduit installation as required by the IEEE regulations	3.64	3.75	0.65	1.03	3.67	A
Grand	Mean	3.76	3.31	0.68	0.88	3.62	HA

\bar{x}_1 = Mean rating of graduates, \bar{x}_2 = Mean rating of supervisors, s_1 = Standard deviation of graduates, s_2 = Standard deviation of supervisors, \bar{x}_g = Mean of means, HA= Highly Acquired. While n_1 =no. of Graduates, n_2 =no. of Supervisors and n_t = Total no. of respondents

The following table showed the grand mean of both the graduates and supervisors as 3.62 meaning generally, the level of skills acquired is high (HA) and so graduates need no assistance to complete task.

Hypothesis

There is no significant difference between the mean ratings of Diploma graduates of Electrical Engineering and their supervisors on skills acquired in Electrical Installation of Buildings

In order to test the hypothesis, grand means and standard deviations of the ratings of Diploma Electrical Engineering graduates and supervisors on the skills acquired in electrical installation of buildings were calculated and used to determine the z value as shown in the Table below

Table 5 z-test analysis of the ratings of National Diploma Electrical/Electronic Engineering Graduates (NDEEG) and Electrical Works Supervisors (EWS) on level of skills acquired by graduates in electrical installation of buildings

Respondents	\bar{x}	s	n		Z _{cal}	Z _{crit}	Remark
NDEEG	3.76	0.068	75		3.14	1.96	Rejected
EWS	3.31	0.195	32				

\bar{x} = mean, s = standard deviation, n = number of respondents, Z_{cal} = Z- calculated,

Z_{crit} = z-critical

Table 5 shows that the Z_{cal}. (3.14) was greater than the table value Z_{crit}. (1.96) hence the null hypothesis H₀₁ was rejected.

Findings of the Study

The findings of the study of the skills acquired by Diploma Electrical Engineering graduates based on the analyzed data yielded the following results:

In module 1 the graduates highly acquired skills in nine tasks out of thirteen and in the remaining four tasks graduates moderately acquired skills. However the grand mean revealed that graduates highly acquired (HA) skills in electrical installation of buildings.

Discussion of Findings

Findings of the study have been discussed reflecting on the research question and hypothesis.

The findings of the study on electrical installation of buildings revealed that the graduates highly acquired skills in this module. This finding is in agreement with Uwaifo (2009) where it was reported that given the level of facilities for practical exercises in domestic installation in the nation's technical colleges and Polytechnics, its products should perform above average. Similarly it was reported in a study of skills acquisition and job performance by graduates of electrical installation and maintenance works in technical colleges of North East zone conducted by Moses (2013). This finding is also in agreement with the findings of Elobuiké (1999) who earlier found out that, teachers in technical colleges lay more emphasis on domestic installation as a result of availability of training materials at the expense of other modules. Significant difference exist between the mean responses of the graduates and their supervisor because the z value is greater than the z critical and therefore the hypothesis is rejected.

Conclusion

Based on the results obtained in this study it can be concluded that National Diploma Electrical Engineering graduates highly acquired skills and so the graduates need no assistance in completing almost all tasks. The hypothesis one is rejected meaning that there is significant difference between the graduates and their supervisors on level of skills acquired in electrical installation of buildings

Recommendation

Based on the conclusions presented, the following action is recommended with regard to the issues addressed by the research question and hypothesis in this study:

Polytechnics should keep up their performance in imparting the knowledge and skills in electrical installation of buildings on the graduates and also expose the students to new methods and technologies with regards to electrical installation of buildings.

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