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COMPETENCIES NEEDED BY STUDENTS OF TECHNICAL COLLEGES IN DOMESTIC AND INDUSTRIAL INSTALLATION

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Abstract: The study was undertaken to fulfill the need of the future and continuity of domestic and industrial installation in the society through adequate competency acquisition by technical college students that constitute the main source of workforce in electrical installation on successful graduation. It was pertinent to carry out this study since the National Business and Technical Examination (NBTE) showed consistent poor performance of students of electrical installation trade. The study focused on the competencies needed by technical college students of electrical installation trade. Two research questions guided the study. A survey research design was adopted. The instrument used was a 58 item questionnaire that elicited information from students on the needed competencies in domestic and industrial installation. The questionnaire was administered on the 170 final year students of electrical installation and retrieved by the researcher. The reliability of the instrument was determined by using Cronbach alpha which yielded 0.84. The data collected from the respondents were analyzed using a five point scale. The means and standard deviations were determined and any item that scored 3.50 and above were regarded as being needed by respondents. From the data analyzed, it was found that students require competencies in domestic and industrial installation. Many aspects including carrying out connections of single and poly phase distribution boards, explaining of working drawings and IEE regulations, installation of generators and electric motors, performing effective earthing and others were found to be needed by students.

Keywords: Competency, domestic installation, industrial installation, electrical installation, need.

Introduction

Electrical installation comprises of domestic and industrial installations. It is one of the courses taught at Technical Colleges in Ebonyi State and Nigeria where Technical colleges are available. In detail, domestic and industrial installations



comprise of applied and Basic Electricity, cable jointing, winding of electrical machines, conduit and surface installations, installation and maintenance of various electrical appliances in domestic and industrial systems and caravan installations.

In accordance with National Board for Technical Education (2006) the goals of industrial installation are to train students in knowledge and skills that will enable them carryout various types of factory or industrial installations and repairs, industrial installations usually involve high voltages such as 415 volts and above, Gupta (2005). The high voltages are meant to be adequate to operate heavy duty machines usually utilized in the industries for production purposes. Electrical installation trade is thus taught at the technical colleges to provide students with skills that would make them reliant on graduation. The students can equally after graduation with the requisite skills proceed to higher education or be employed in recognized institutions.

Ogbuanya (2013) posited that majority of graduates in developing counties are jobless due to incompetence in skill areas they are supposed to possess. The graduates of electrical installation trade are not competent to take up jobs relating to their areas of specialty. According to NABTEB technical college examination conducted in 2013, showed that many students performed below expectation especially graduates of Electrical Installation. It thus implies that much effort is needed to impart to students the requisite competencies that would enable them be employable in recognized institutions or become economically self-reliant in the society.

Competency is the ability that is acquired through training to undertake a skill characterized with varying complexities and difficulties. Blank (2013) posited that



competency is the state of knowledge, skills and attitude to act effectively. Competency is a skill acquired through practice. Sowande(2015) posited that skill competency is a manual skill demonstrated through repetitive performance of the operation learnt. The author believes that competency epitomizes possession of skills as a means of demonstrating learned habits and thinking which becomes relatively automatic.

Competency and skills needs represent the existing gap between the teachers' expected pedagogical abilities and their actual performance. It is therefore necessary to determine such gaps since the knowledge can act as a guide for action in terms of electrical installation instruction in technical colleges. Nneji (2010) posited that the Nigerian teachers have been held responsible to a large extent for disappointing quality of education thus, the study of competency needs of electrical installation students is very imperative.

Methodology

In order to successfully generalize findings made from findings on a population through sample studied, survey design is usually acceptable, Borg, Gall and Gall (2013). The area of the study is government technical colleges in Ebonyi State comprising of three (3) colleges situated in the south, north and central education zones of the state. The colleges were chosen because electrical installation trade is offered by students in the colleges. The population consisted of 170 electrical installation students of the technical colleges in the three education ones. Final year students were chosen because they have been sufficiently instructed on the competencies that would make them employable and self-reliant on



possible graduation. There was no sampling since the population was relatively small and manageable by the researcher. A structured questionnaire on competencies on electrical installation designed by the researcher after literature review was utilized to elicit responses on the competency needs of electrical installation students. The questionnaire consisted of 58 items designed to provide answers to the two research questions that guided the study. A five response mode was employed to ascertain the competencies required by electrical installation trade students thus; very-highly required (VHR), required (R), moderately required (MR), required (R), and not required (NR). The 170 copies of the questionnaire were by personal contact distributed to the students and collected directly from the respondents. The instrument was subjected to face validation by three (3) experts in technology education of the Ebonyi State University. After validation; some items were accordingly restructured from the suggestions of the experts before they were included in the questionnaire items that were finally administered to respondents making a total of 58 items. The items were trial tested on 10 students among the college students not under study. Data analyzed using Cronbach Alpha yielded a reliability coefficient of 0.84. The instrument was therefore adjudged reliable for the study. Mean and standard deviation were utilized to analyze the data collected on the 5-point category scale. A mean of 3.50 was therefore accepted as a required competency, but any item lower than 3.50 was dropped as being rejected. The students do not require such competencies with mean lower than 3.50.



Purpose of the Study

The study sought to determine the competencies needed by technical college students of electrical installation for sustainable development in Nigeria. Specifically the study sought to determine the competency needs of technical college students in (i) Domestic installations (ii) industrial installations.

Research Questions

The following research questions guided the study;

1. What are the competencies needed by technical colleges students in domestic electrical installation?
2. What are the competencies needed by technical college students in industrial electrical installation?

Results

Research Question 1: What are the competencies needed by technical college students in Domestic Electrical Installation?

To answer this research question, the students made the following responses as presented in table 1 below;

Table 1: Students' Domestic Installation Competency Needs Responses

S/N	Competency needs type	Mean (\bar{x})	Standard Deviation SD)	Remarks
1.	Explain standard single phase distribution board	3.55	6.41	Needed
2.	Explain poly phase distribution board	3.33	8.57	Needed
3.	Carryout connections in single phase distribution fuse board	3.37	8.56	Needed
4.	Identify simple installation tools like jimlet, screw drivers, pliers and cutters	3.33	6.66	Needed
5.	Bend conduct pipes accurately	3.21	8.30	Needed
6.	Explain electrical domestic installation symbols	3.40	6.50	Needed



	accurately			
7.	Interpreted working drawing	3.29	0.93	Needed
8.	Locate switches at correct height from floor	3.07	1.11	Needed
9.	Explain domestic electrical accessories accurately	3.07	0.91	Needed
10.	Explain IEE (institution of electrical engineers regulations) as they apply to domestic electrical installation	3.43	0.97	Needed
11.	Identify incandescent loans of various ratings	3.15	0.77	Needed
12.	Install fuses in distribution boards	3.23	0.834	Needed
13.	Carryout insulation resistance test successfully	3.13	0.84	Needed
14.	Carryout polarity test correctly	3.00	0.96	Needed
15.	Install earth continuity conductor	3.68	0.53	Needed
16.	Properly tighten contacts to obviate arching on partial contact	2.92	0.94	Not needed
17.	Draw wires into conducts	3.27	1.01	Needed
18.	Install currant breakers (earth leakage)	3.04	0.98	Needed
19.	Explain IEE regulations concerning circuits breakers functionality	3.03	.97	Needed
20.	Arrange fuses for single phase unit	3.00	.97	Needed
21.	Arrange fuses for poly phase circuits properly	3.43	.66	Needed
22.	Test for short circuits	2.92	1.17	Not needed
23.	Main electrical tools	3.04	0.94	Needed
24.	State IEE regulations concerning conduit work	3.74	0.72	Needed
25.	Install lightning arrestor on buildings	3.25	1.03	Needed

Results in Table 1 on competency needed by technical college students on domestic installation showed that 23 items were accepted while only items 16 and 22 were rejected as not needed by students.

Research Question 2: What are the competencies needed by technical college students in industrial electrical installation?

To answer the research question, the respondents made the following responses in table 2 below

Table 2: Mean Responses of Respondents on the Competencies in Industrial Electrical Installation Needed by Students

S/N	Competencies Needed in Industrial Electrical Installation	Mean (\bar{x})	Standard Deviation (SD)	Remarks
1.	Testing machine polarities	3.38	0.76	Needed
2.	Install electric motors	3.55	0.53	Needed
3.	Effectively earth motors	3.30	0.96	Needed



4.	Install generators	3.33	0.73	Needed
5.	Effectively earth generators	3.60	0.76	Needed
6.	Install a motor starter	3.28	0.81	Needed
7.	Calculate cable rating for motors	3.66	0.79	Needed
8.	Connect star-delta system	3.64	0.90	Needed
9.	Construct the foundation for mounting motors	3.28	0.93	Needed
10.	Construct foundation for mounting generators	3.78	0.61	Needed
11.	Explain motor applications	3.47	0.89	Needed
12.	Identify key elements in industrial installation	3.71	0.63	Needed
13.	Demonstrate trunk wiring for industries	3.10	1.20	Needed
14.	Differentiate different forms of trucking	3.10	1.20	Needed
15.	Draw wires into trunks	3.32	0.78	Needed
16.	Install a bus bar	3.32	0.78	Needed
17.	Connect circuits from bus bar termination	3.45	0.50	Needed
18.	Join trunks effectively	3.50	0.91	Needed
19.	Use saddles to hold conduit pipes	3.10	1.20	Needed
20.	Draw wires to surface conduits	3.10	1.20	Needed
21.	Fix accessories on trucking systems	3.45	0.76	Needed
22.	Connect earth continuity conductor on trucks	3.45	0.76	Needed
23.	Explain generator principles	3.38	0.53	Needed
24.	State motor principles of operation	3.35	0.53	Needed
25.	Explain functions of A/C machines	3.38	0.53	Needed
26.	Explain functions of generator parts	3.36	0.68	Needed
27.	Show motor shunt connections	3.36	0.68	Needed
28.	Show motor series connections	3.26	0.74	Needed
29.	Explain how to enclose machines	3.26	0.74	Needed
30.	Detect fault from motors	3.47	0.52	Needed
31.	Detect faults from generators	3.47	0.52	Needed
32.	Make repair of machine specifications	2.23	1.10	Not Needed
33.	Use motor repair equipment effectively	2.23	1.10	Not Needed

The results of the data collected and analyze instable two (2) showed that 31 items were highly needed by the respondents while two items, 32 and 33 were rejected. They are therefore not needed by the technical college students of electrical installation trade.

Findings

From the data collected and analyzed, the following findings have been made:

1. Students need competency on conducting domestic installation through being capable of explaining single phase and poly phase systems of installation,



installing generators, motors, meters and various wiring systems. Students also accepted that they need every other item in table 1 except items 16 and 20.

2. Respondents need competencies on industrial installation such as being able to test motor and generator polarities, install motors, generators and earthing systems. Every other item were accepted as being required for competency acquisition except items 32 and 33.

Discussion of Findings

The competencies needed by technical college students on electrical installation trade were analyzed and determined. Most of the competencies were found relevant indicating that they are necessary for occupational performance of the students of electrical installation trade on graduation. Individuals that are competent in their trades can possibly be motivated to perform satisfactorily in their jobs. This is in tandem with Ogbuanya, Abduhahi and Ado (2013) as they posited that personality development can be described as a combination of a press and need and the desire to satisfy or gratify these needs directs or indicates human behaviour. The felt need of any programme before commencement of any training must be ascertained, therefore, the perceived needs of the students must be considered. Students agreed that they need competencies such as being capable to explain standard single phase and poly phase motors and generators. The respondents also need competencies on carrying out conduit work, locating of electrical accessories in domestic installation work and being capable of installing fuses in distribution fuse boards. All the items on domestic installation were accepted as areas where competencies are needed except items 16 and 22. Students did not see the need of



possessing competencies of tightening electrical contacts to obviate arching and testing for short circuits in domestic installation work. Ogbuanya (2013) posited that a skilled electrical installation work or must be competent in carrying out all aspects of electrical installation work. The competency in electrical installation ought to be all encompassing as a deficit knowledge and competence in any aspect of the occupation can cause far reaching hazards to electrical users.

Respondents accepted that they need competency in all the items in table two (2) except items 32 and 33, repairing of machines according to specifications and effective utilization of repair equipment in repairing eclectic motors were not seen as areas where competencies are needed by technical college students. This is contrary to Moses, Ezugu, Apagu and Okoye (2014) who pointed out that technical college graduates should acquire academic and technical skills that afford employment and sustain their longevity as productive members in today's complex work environment.

The findings of the study possess the following implications. Students of technical colleges need appropriate competencies in domestic and industrial installations for relevant skilled psychomotor development that would enable them fit as efficient workers in the world of work or be employable in recognized institutions that have to do with electrical installation work. Teachers are therefore faced with the onerous tasks of imparting required competencies in technical college students to enable them properly undertake electrical work in domestic and industrial premises. Another implication of the study is that many technical college students need competencies in the use of tools and equipment in carrying out electrical installation



work without competency in use of tools and equipment, skills development in electrical installation would be a mirage and students on graduation cannot competently carryout either domestic or industrial installation successfully.

Conclusion

Sufficient possession of competencies in electrical installation by technical college students for effective demonstration of psychomotor skills in the world of work is paramount and basic. Students need relevant competencies to effectively demonstrate the skills in domestic and industrial installations. The findings of the study showed that students expressed that they actually need competency on domestic and industrial installations. The findings of the study also showed that some cogent points that the National Board for Technical Education (NBTE) should revisit the curriculum in terms of ascertaining the competencies needed by technical college students in electrical installation trade. From the findings, there are some competencies that are to be ensured that students possess them in carrying out work in electrical installation such as in domestic and industrial installation. The competencies students require in electrical installation trade should not be limited but should be all embracing.

Recommendations

From the findings of the study, the following recommendations were made:

1. The competencies needed by the students as identified in the study should form the bases of instruction by technical college teachers. The curriculum should be implemented with the aim of making students acquire the needed competencies. The teachers should ensure that domestic installation



competencies are well taught to enable students acquire adequate psychomotor skills to carry out various aspects of domestic installation.

2. NBTE and curriculum planners should ensure that the students are exposed to all aspects of curriculum that will make them acquire needed competencies in industrial installation curriculum planners should therefore utilize the identified competencies in this study to develop the content of the curriculum of instruction for teachers of technical colleges. In-service training could be employed to up skill the electrical installation teachers to enable them impart on students the needed competencies.

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