

Full Length Research Paper

Theoretical knowledge competencies required by trade artisans in domestic and industrial electrical installations in Enugu State, Nigeria

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Technological development especially in the field of electrical/electronics poses a great challenge for electrical trade artisans with obsolete skills. The need to enhance the relevance of these artisans necessitated this study to determine theoretical knowledge competencies they require for domestic and industrial electrical installations in Enugu State. One research question guided the study and two null hypotheses were tested at 0.05 level of significance. Survey research design was adopted and a population of 677 (542 electrical trade artisans and 135 supervisors) was studied without sampling. The instrument for data collection was a 5-point rating scale questionnaire with 12 items which was validated by three experts. two in the field of technical education and one in educational measurement and evaluation. The instrument was subjected to reliability testing to determine its internal consistency, using Cronbach Alpha which yielded a coefficient of 0.81. Data collected were analysed using mean and standard deviation to answer the research question and determine the homogeneity or otherwise of the respondents' means, while t-test was used to test the null hypotheses. Findings of the study showed that the artisans highly require all 12 theoretical knowledge competencies listed on the instrument to be effective and efficient in their vocation. The respondents did not differ significantly in their mean ratings as a result of status and experience. Based on the findings it was concluded that electrical/electronics trade artisans need retraining to acquire theoretical knowledge competencies in order to overcome the challenges in domestic and industrial electrical installations posed by technological development. The researchers, therefore, recommended that curriculum planners should widen the contents for training and retraining of electrical trade artisans to incorporate relevant theoretical knowledge competencies in their trade areas and that government at all levels should encourage artisans in the public and private sectors to upgrade themselves by undertaking in-service training to improve their socio-economic status.

Key words: Theoretical knowledge, competencies, trade artisans, electrical installations.

INTRODUCTION

Education is the process of facilitating learning, or training acquisition of knowledge, skills, values, beliefs

and habits which can take place in formal or informal settings. Any experience that has a formative effect on

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the way an individual thinks, feels or acts may be considered as educational. Education in a formal setting is a dynamic instrument of transformation and socio-economic development among individuals and nations. Formal education occurs in a structured environment with multiple students learning together under trained, certified teachers. This differs from informal education/learning (otherwise known as apprenticeship) which occurs in a variety of places such as home, through daily interactions and shared relationships among members of society and workshops of master craftsmen.

Technical education is the aspect of education which leads to the acquisition of practical and applied skills as well as scientific knowledge (Federal Republic of Nigeria, 2004). Onoh, Onu and Olukaet (2012). defined technical education as a form of vocational training designed to prepare students to enter occupations that require technical knowledge and understanding of the laws of science and technology as applied to modern design and production. Governments all over the world invest massively in technical/vocational education programmes since they help students to acquire both theoretical knowledge and technical skills required for the modern age of science and technology. Thus, technical education programmes assist nations in addressing the problem of unemployment and other related problems emanating from it by producing skilled graduates that can succeed in paid or self employment.

From experience, Nigeria has not fully enjoyed the benefits of technical education as expected because the programmes are facing enormous challenges. UNESCO (2010) outlined such challenges to include poor funding, inadequate capacity building programmes for teachers/lecturers, lack of modern equipment and facilities, uncoordinated and ineffective training of students and inadequate government support. These problems affect the level of skills and competencies acquired by university graduates of technical education and the electrical trade artisans trained in the field as company or workshop supervisors.

Electrical/electronic students of the programme are trained for occupations in the electrical industries where they serve as electrical workshop managers and train electrical trade artisans. For effective and meaningful management of an electrical workshop, the workshop manager should have adequate theoretical knowledge and skills to be able to effectively inculcate them in their trainees because a person can only give what he has. Electrical workshop managers should possess general and special technical theory in technical education to be able to competently instruct and train artisans to become technicians or craftsmen. Such managers are masters of their craft who, in addition to their educational qualifications, have excelled in their skills by practical experiences of many years, but in many cases their theoretical knowledge content is inadequate. Elobuiké (2006) explained that theoretical knowledge has to do with the "why of work"

experience and is basic for intelligent work performance and process. Elobuiké further stated that the related theoretical knowledge contents for effective technical/electrical workshops management include, technical information, vocational concepts, scientific knowledge and work experience necessary for engineers, technologists and industrialists in order to improve and solve industrial problems. Adequate possession of theoretical knowledge will significantly increase the efficiency and productivity of electrical trade artisans in domestic and industrial electrical installations.

Becker and Mincer in Babalola (2003) posited that theoretical knowledge is specialized knowledge used to execute specific machines operations, safety guards and to develop the whole person psychologically, physically, mentally, socially, and occupationally. Theoretical knowledge is apparently related to general education. General education enables individuals to learn some habits of hygiene, change their thinking pattern and improve decision making process. According to Elobuiké (1999) general education is a universal education for all persons (children, youths and adults) and is needed for developing aptitudes, abilities and behaviours considered desirable in the society. Therefore, it will be difficult for anybody who is not especially exposed to general education to understand the theory of any trade.

Giachino and Gillington in Uzoagulu (2002) maintained that any vocational technical graduate irrespective of the level should be able to apply some principles and theories of the trade or occupation to solve problems in the area of practice. Hence, any artisan who is theoretically handicapped tends to act on guess work because of the half baked and unbalanced knowledge in the trade. Okorie in Nwafor (2006). explained that even if the local artisans function very successfully in the labour market, they will remain at the lowest cadre/level of manpower/personnel because they lack the theoretical knowledge of the trade which ought to help them obtain some trade or technical qualifications. Theoretical knowledge is very essential for artisan trade because it will make them full-fledged skilled workers who are able to determine the functions of equipment and machines, use of materials and tools and as well as master, with confidence, the care and safety measures in the trade. In other words, lack of theoretical knowledge can make electrical trade artisans to be deficient especially in reading and interpreting simple working drawings and operating manuals of new equipment or machines introduced in their area of occupation.

According to the Federal Republic of Nigeria (FRN, 2013), the philosophy of education is based on the development of the individual into a sound and effective citizen through provision of equal educational opportunities for all citizens inside and outside the formal school system. Okogba in Nwafor (2006) criticized the illiterate and semi-literate artisans who lacked theoretical concepts but merely passed through training programmes and argued that such will never meet the labour market

standards/requirements. This is why Elobuiké (1999) concluded that theoretical knowledge guides the practical aspect of getting a job/work done. This means that theory should come before practice. The implication of this statement is that every trade artisan should possess theoretical knowledge as a pre-requisite for success in the acquisition of practical skills and competencies in the vocation. Competency is the ability to do something well. It is the specific ability one has to perform or carry out tasks with efficiency and effectiveness. According to Alio and Uzor (2010), competency is the combination of knowledge, skills, attitude and values displayed in the context of task performance. Alio and Uzor further stated that competency is a combination of knowledge, skills and attitudes that can be developed through training in order to accomplish some specific tasks. Technical workers can acquire high competency level in specific occupations through long years of experience in the vocation. Obayi, Obi and Okaforet (2012) posited that workers are not born with capabilities but their potentials can be stimulated and developed by appropriate training methods.

Domestic and industrial electrical installations are specialized areas of electrical trade offered in technical colleges and technical education programmes in universities in Nigeria. Courses in electrical installations include basic electricity, battery charging, domestic installation, industrial installation, cable jointing and winding of electrical machines (Ogbuanya, Abdullahi and Adoet 2013). Domestic installations include installation of electrical components or equipment and appliances for home use. It also involves surface wiring, conduit wiring and maintenance of electrical fittings in homes. The National Board for Technical Education (NBTE, 2008) explained that industrial installation provides graduates of technical programmes with knowledge and skills to undertake electrical installation in industrial factory buildings. Competency of electrical trade artisans is their ability to carry out domestic and industrial electrical installations efficiently and effectively, to enhance their socio-economic status or standard of living in the society.

Electrical trade artisans require theoretical knowledge competencies to be able to read, understand and interpret complex circuits and drawings that are current in order to carryout domestic and industrial installations effectively and efficiently. Hence, the need for theoretical knowledge competencies in electrical trade cannot be over emphasized. Okoro (2004). observed that electrical trade artisans that passed through apprenticeship lack theoretical knowledge since their training programme lack theoretical knowledge contents and is shallow in scope. This is why Elobuiké (2006) asserted that apprenticeship system vis-à-vis artisan training should incorporate theoretical knowledge, practical skills and work attitude in a quantitative manner in chosen occupations to enable the artisans perform effectively in worthwhile socio-economic life and different work conditions. As a result of

the narrowness of the apprenticeship training programme and other constraints encountered by the artisans during their initial training, most are still incompetent even at the time of graduation (Osuala, 2008). Osuala further stated that the problem might be from workshop managers who did not provide all the relevant theoretical knowledge and skills needed by the apprentices. Ezeji (2006) noted that the apprentices are taught directly on how to solve problems without knowing the source of the problem and this narrows their experiences, leaving them incompetent on graduation. It is against this backdrop that the researchers deemed it imperative to determine the theoretical knowledge competencies required by trade artisans in domestic and industrial electrical installations in Enugu State to guide workshop managers in inculcating them in their trainees for better performance.

Purpose of the study

The purpose of the study was to determine theoretical knowledge competencies required by trade artisans in domestic and industrial electrical installations in Enugu State.

Research question

One research question guided the study, which is:

(1) What are the theoretical knowledge competencies required by trade artisans in domestic and industrial electrical installations in Enugu State.

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

(1) There is no significant difference in the mean ratings of electrical trade artisans and their supervisors on the theoretical knowledge competencies required by trade artisans in domestics and industrial electrical installations in Enugu State.

(2) There is no significant difference in the mean ratings of experienced and inexperienced trade artisans on the theoretical knowledge competencies they require in domestic and industrial electrical installations in Enugu State.

METHODS

Survey research design was adopted for the study which was carried out in Enugu State in South-East Nigeria. The population of 677 (542 electrical trade artisans and 135 supervisors) was used for the study without sampling. Instrument for data collection was a 12 item five-point rating scale questionnaire ranging from Very Highly Required (VHR), Highly Required (HR), Required (R),

Table 1. Respondents mean ratings and standard deviation on theoretical knowledge competencies required by trade artisans in domestic and industrial electrical installations.

| S/N | Theoretical knowledge competencies include the ability to: | Mean | SD | Remark |
|-----|--|-------------|-------|------------------------|
| 1. | identify faults easily | 4.55 | 0.75 | Very Highly Required |
| 2. | Change faulty parts | 4.46 | 0.73 | Highly Required |
| 3. | Identify tools used in electrical work | 4.32 | 0.79 | Highly Required |
| 4. | Use metres | 4.29 | 0.77 | Highly Required |
| 5. | Solve simple mathematical problems that is, addition, subtraction, multiplication and division | 4.21 | 0.87 | Highly Required |
| 6. | Interpret electrical/electronic drawings and symbols | 4.13 | 0.95 | Highly Required |
| 7. | Interpret bills of quantities used for work | 4.04 | 0.97 | Highly Required |
| 8. | Communicate in oral English | 4.05 | 10.17 | Highly Required |
| 9. | Read and write English language | 4.24 | 0.75 | Highly Required |
| 10. | Interpret basic scientific concepts | 3.99 | 0.96 | Highly Required |
| 11. | Select the right tools for a particular job | 4.42 | 0.75 | Highly Required |
| 12. | Use or wear safety materials | 4.32 | 0.84 | Highly Required |
| | Mean of means | 4.25 | | Highly Required |

Slightly Required (SR), to Not Required (NR). The instrument was validated by three experts two in the field. of technical education and one in educational measurement and evaluation from NnamdiAzikiwe University, Awka The reliability of the instrument was determined through a post test, where it was administered to 25 persons (15 electrical trade artisans and 10 supervisors) in Ebonyi State who were not part of the population of the study. The data collected were analyzed using Cronbach Alfa to establish its internal consistency and a reliability of 0.81 was obtained. The instrument was administered to the study population in their workshops personally by the researchers with the help of five research assistants, using on the spot method to facilitate a high response rate. 631 copies of the questionnaire (representing 93 percent) were retrieved and used for the study.

Data collected were analyzed using mean and standard deviation to answer the research question and determine the homogeneity or otherwise of the respondents while z-test was used to test the null hypotheses at 0.05 level of significance. The item mean was used to take decision on the items while the mean of means was used to answer the research question relative to the real limit of numbers. A null hypothesis was rejected where the calculated z-value was equal to or greater than the critical z-value at 0.05 level of significance, otherwise it was not rejected.

RESULTS

Table 1 shows that item one has a mean score of 4.55 while the rest have mean ratings ranging from 3.99 to 4.46. The mean of means of 4.25 shows that the respondents rated theoretical knowledge competencies as highly required by trade artisans for domestic and industrial electrical installations in Enugu State. Standard deviation for all the items except one fell within the same range, showing that the respondents were homogenous in their opinions. The result in Table 2 reveals that the calculated z-value of -1.26 is less than the critical value of 1.96 at alpha level of 0.05 and df 629. This indicates that there is no significant difference in the respondents'

mean ratings on the theoretical knowledge competencies required by trade artisans in domestic and industrial electrical installations as a result of status (artisans and supervisors). Therefore, the null hypothesis was not rejected.

The result in Table 3 shows that the calculated z-value of -4.51 is less than the critical value of 1.96 at alpha level of 0.05 and df 501. This indicates that there is no significant difference in the mean ratings of experienced and inexperienced trade artisans on the theoretical knowledge competencies they require in domestic and industrial electrical installations in Enugu State. Therefore, the null hypothesis was not rejected.

DISCUSSION

The results of the study show that trade artisans in domestic and industrial electrical installations in Enugu State highly require theoretical knowledge competencies to function effectively and to improve their living standard. The finding is in consonance with the assertion of Becker and Mincer in Babalola (2003), that theoretical knowledge is specialized knowledge used to execute specific machine operations, observe safety guards, and develop the whole person psychologically, physically, mentally, socially and occupationally. It is also consistent with Elobuiké (2006) who posited that theoretical knowledge guides the practical aspect of getting a job well done and is a pre-requisite for successful acquisition of practical skills for competency in any given vocation. Furthermore, the fact that both supervisors and artisans themselves did not differ significantly in their mean ratings on the extent trade artisans require theoretical knowledge competencies they confirms their relevance for the artisans in satisfying those

Table 2. Summary of z-test analysis of respondents mean ratings on theoretical knowledge competencies required by trade artisans in domestic and industrial electrical installations based on status.

| Status of respondents | N | \bar{X} | SD | df | z-cal | z-crit | Remarks |
|-----------------------|-----|-----------|------|-----|-------|--------|-----------------|
| Artisans | 503 | 4.24 | 0.46 | 629 | -1.26 | 1.96 | Not Significant |
| Supervisors | 128 | 4.30 | 0.54 | | | | |

Table 3. Summary of z-test analysis of experienced and inexperienced trade artisans' mean ratings on theoretical knowledge competencies they require in domestic and industrial electrical installations.

| Electrical Trade Artisans | N | Mean | SD | df | z-calc | z-crit | Remarks |
|---------------------------|-----|------|------|-----|--------|--------|-----------------|
| Experienced | 178 | 4.38 | 0.45 | 501 | -4.51 | 1.96 | Not significant |
| Inexperienced | 325 | 4.19 | 0.47 | | | | |

work for. This finding agrees with the study of Giachino and Gillington in Uzoagulu (2012) who posited that vocational technical education graduates of all levels should be able to apply some principles and theories of the trade in order to solve problems associated to the area of the practice.

Finding of the study further revealed that experienced and inexperienced artisans did not differ significantly in their mean ratings on the extent they require theoretical knowledge competencies. This is not surprising because theoretical knowledge competencies acquired through general education are vital in the overall performance of artisans. This finding is in line with Elobuike (2006) who posited that general education is needed by all persons, children, youths and adults, to develop knowledge and acquire skills, aptitude, abilities and behaviours considered desirable by society but not necessarily preparing them for specific types of occupations. The finding is also in agreement with Odigbo (2004) who stated that the thrust of general education is to produce a generation of committed, conscientious, creative, resourceful, and all round individuals who would be functional in their societies.

Conclusion

From the findings of this study, it was concluded that lack of theoretical knowledge competencies will render trade artisans in domestic and industrial electrical installations highly ineffective and inefficient in their vocation.

RECOMMENDATIONS

Based on the findings of this study, the researchers recommend that:

1. Electrical trade artisans should take advantage of the Wonderful opportunities given by NDE to upgrade

themselves, through acquiring relevant theoretical knowledge competencies and certification in their vocation for more recognition effective performance.

2. Master craftsmen and supervisors should attend workshops/seminars regularly to keep abreast with the current happenings or changes in technological development in order to adequately prepare their apprentices for success in their vocation.

3. Curriculum planners should widen the contents of training and retraining of technical workers to incorporate modern skills and competencies in their respective trade areas.

4. Governments should create adequate awareness about the skills offered by the National Directorate of Employment (NDE) for graduates and non-graduates so as to offer them the opportunity for skills upgrade in their fields.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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