



Electrical Installation and Maintenance Skills Required by Graduates of Science and Technical Colleges for Self-Employment in Yobe State

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ABSTRACT

The study determined the skills required by graduates of electrical installation and maintenance work trade in Science Technical Colleges in Yobe state. The study adopted survey research design and was guided by three research questions. The population of the study comprises of all the electrical installation and maintenance work teachers in the eight Science and Technical Colleges in Yobe state. Data was collected using a structured questionnaire and mean was used to answer the research questions. The findings of the study among others revealed that the graduates required almost all the mentioned skills for self-employment in both domestic and industrial installation as well as in winding of electrical machines. Based on these findings therefore, it was recommended among others that teachers of electrical installation and maintenance work in Yobe State science and technical colleges should be retrained by the government on the implementation of the skills identified for self-employment in domestic, industrial installation and winding of electrical machines.

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INTRODUCTION

The Electrical Installation and Maintenance Work is a course in Technical Education that is aimed at preparing individuals with necessary skills in electrical work to earn a living. Skills are usually gained through training. Skills if developed and refined are useful or marketable during career development (Mbag, 2011). Electrical installation and maintenance works is a technical trade, at Technical Colleges and is divided into three employability modules (Mbag, 2011). The three modules are: domestic electrical installation, industrial electrical and machines modules and winding of electrical

machines (NABTEB, 2006). Each of these modules provide employable technical skills to the students.

Domestic electrical installation is a term which is widely used as the electrical installation for domestic use of electricity (Mbag, 2011). Mshelbwala (2008), explained domestic installation as "the installation that does not require heavy and special materials but for simple and intermediate materials to wire the various points of need in the house and commercial places Domestic installation can be classified into surface, conduit, trunking and ducts (Francis, 1988).



Industrial electrical installation module intends to provide trainee with the knowledge and skill to enable him/her carryout the types of industrial/factory electrical installations and maintenance work (Mbaga, 2011). On completion of training, the trainee should be able to:

1. Identify different types of industrial electrical installation;
2. Describe the installation of different types of ducts and trunking applying all relevant regulations and safety precautions;
3. Explain the principles of operation of AC and DC machines and their applications; install all types of electrical machines;
4. Identify various methods of controlling electrical machines; explain methods of maintaining electrical machines; install MICC cable (NABTEB, 2006, P. 4)

Winding of electrical machines is a subject where a student deals with various types of machines, which are employed in industries, power stations, domestic and commercial appliances e.t.c. (Terrel, 2004). According to NABTEB (2006) rewinding of electrical machine is aimed at acquainting the trainee with the knowledge and skill that will enable the learner wind and rewind AC and DC rotating/static machines up to 10KVA. The Educational resources needed for this trade as outlined by NABTEB (2011) include Relevant Statutory Regulation, Chalkboard, Electrical tool box, Mechanical tool box, Starter, Coil, Exploded view of a motor, Nameplate, Shields, Rotor circuit, Stator core, Carbon brushes, Various conductors and insulators, Laminated iron core, Iron formers, Megger tester set, Avometer, Varnish, Thinner, Gauge wire motors, Commutator, Rotors, Hydraulic press, Grease e.t.c. On completion of the training, the trainee should be able to: Apply all IEE statutory regulations during electrical

winding work; identify and select appropriate tools and equipment used for electrical winding jobs; display skills for dismantling electrical machines for rewinding; demonstrate skills for dismantling machines for rewinding; carryout rewinding of burnt static / rotating electrical machines; explain skimming/undercutting of armature, commutators and slip ring of electrical machines; rewinding of machines and equipment and test for winding continuity, insulation, corrects rotating voltage (P. 8).

Technical colleges are mainly established for the training of students to acquire practical skills, knowledge and attitudes essential for employment in a given occupation. Technical colleges are regarded as principal vocational institution in Nigeria. They give full training intended to prepare students for entry into various occupations (Okoro, 2006). Technical college offer course in carpentry and joinery, cabinet making welding and fabrication, painting and decoration, electrical installation works, radio and television and electronics work. Okoro (2006) observed that the formal education and training system are not sufficiently linked with the world of work, which makes it difficult for the graduates of the system, particularly those who study electrical installation and maintenance work to secure employment in areas related to their fields of study. Technical college graduates require knowledge and skills that will enable them to be self-employed or self-reliant in electrical installation and maintenance works.

Skill is refers to an individual's capability to control elements of behaviour, thinking and feeling within specified contexts and within particular task domain (Michael, 2004). Work skills are practical activities, which can help an individual to acquire saleable skills (Olaitan, Igbo, Ekong, Nwachukwu, Onyemachi, 1999). It entails a total array of responsibilities within an



activity that an individual performs for work to have been done.

Employment is the state of having or engaged in a job for some form of payment. Self-employment among the graduates may help the government to reduce societal problems such as burglaries, armed robbery, aggression, frustration, prostitutions, drug addiction and insecurity (Oyebode, 2005). The society needs competent electrical installation work graduates to maintain and repair electrical gadgets and equipment. Therefore there is need to identify skills required by graduates of technical colleges for self-employment in electrical installation work in Yobe State.

The social and economic tensions in the Nigeria scene have led many to query the relevance of the Nigerian education system (Ndu, 2000). Education is a means of social mobility and the key basis by which employers decide who gets the opportunity to work. Education is not just an end in itself but an investment, a means to an end. Adamachi and Romaine (2000) asserted that any amount of money spent on education is a legitimate investment in the nation's future.

Education produces the attitudes, skills, knowledge and personalities upon which modern technology, industrialization, development and production depend. Unfortunately, the social and economic changes of today have changed the job demands of making technical college graduates either unemployable or ill fitted for the demands of the jobs they get. The amount of periods allocated to practical classes in the schools time table is very small compared with the theoretical classes thereby making the technical education to be largely theoretical without the ability to equip the youths coming out of technical colleges with skills to live and fit into the world of work. The options available to technical college graduates as stated in the National Policy on Education among others

are to secure employment, set up their own business invariably, becoming self-employed and be able to employ others (FGN, 2014). These goals with respect to electrical installation work are yet to be achieved (Aina, 1998).

The technical college graduates seeking employment could not secure it because they needed skills for self-employment. Hence, it becomes imperative to investigate the skills required by graduates of technical colleges for self-employment in Yobe State.

Research Questions

The following research questions guided this study:

1. What are the skills required by graduates of technical colleges for self-employment in domestic installation?
2. What are the skills required by graduates of technical colleges for self-employment in industrial installation?
3. What are the skills required by graduates of technical colleges for self-employment in cable joining?
4. What are the skills required by graduates of technical colleges for self-employment in winding of electrical machine

METHODOLOGY

Descriptive survey research design was used for the study. Because the study involves collection of ideas, responses and opinions of respondents. The area of this study is Yobe State. The target population of this study comprised of all the electrical installation and maintenance work teachers across the eight technical colleges of Yobe State. The Instruments for Data collection for this study was a structured questionnaire developed based on the literature. The instrument was validated by three experts. Data collected were analyzed using mean and standard deviation statistics. A cut off mean score of 2.50 and above was



considered as a required by the graduates, while an item with a mean rating of less than

2.50 was considered as skills not required by the graduates for self-employment.

RESULT AND DISCUSSION

Table 1: Mean Responses of the Respondents on the Skills Required in Domestic Installation

| S/N | ITEMS | X | S,D | REMARKS |
|-----|---|------|------|----------|
| 1. | Identify common sources of hazard in domestic electrical installation, | 3.42 | 0.60 | Required |
| 2. | State ways of preventing hazard in domestic electrical installation. | 3.17 | 0.74 | Required |
| 3. | Use of essential safety equipment for domestic installation | 3.21 | 0.17 | Required |
| 4. | Identify the electrical symbols of working drawing. | 3.42 | 0.60 | Required |
| 5. | Knowing the various items and accessories needed for domestic installation. | 3.21 | 0.74 | Required |
| 6. | Installing the electrical accessories as indicated on the working drawing. | 3.57 | 0,57 | Required |
| 7. | Identify common types of protective devices. | 3.18 | 0.90 | Required |
| 8. | Install circuit breaker and fuses in electrical installation. | 3.32 | 0.90 | Required |
| 9. | Knowing the current rating of fuses in electrical drawing. | 3.40 | 0.88 | Required |
| 10. | Determining the cable size to be used for electrical circuit. | 3.41 | 0.88 | Required |
| 11. | Selecting appropriate wiring type for a building. | 2.99 | 0.90 | Required |
| 12. | Carry out simple surface wiring of domestic building. | 3.17 | 0.98 | Required |
| 13. | Applinyng the IEE regulation on electrical domestic surface wiring. | 3.29 | 0.99 | Required |
| 14. | Explain the meaning of conduit. | 3.55 | 0.78 | Required |
| 15. | Identify types of conduit. | 3.00 | 0.77 | Required |
| 16. | Select the appropriate tools for conduit wiring. | 3.04 | 0.96 | Required |
| 17. | Apply regulation guiding conduit wiring. | 3.00 | 0.77 | Required |
| 18. | Carry out continuity and insulation test. | 3.11 | 0.69 | Required |
| 19. | Draw in cable using fish wire. | 3.36 | 0.77 | Required |
| 20. | Selecting appropriate circuit breaker | 3.18 | 0.98 | Required |
| 21. | Install circuit breaker appropriately. | 3.99 | 0.88 | Required |
| 22. | Installing earthing devices | 3.98 | 0.88 | Required |

The result in table 1 above revealed that the graduate of Electrical Installation and Maintenance Work EIMW in Yobe State

Science Technical Colleges required all the 22 skills for self- employment in Domestic Installation after their graduation.



Table 2: Mean Responses of the Respondents on the Skills Required in Industrial Installation

| S/N | ITEMS | X | S.D | REMARKS |
|-----|---|------|------|---------------------|
| 1. | Knowing the surface wiring of industrial installation | 3.17 | 0.98 | Required |
| 2. | Knowing the simple conduit wiring for industrial installation | 3.11 | 0.66 | Required |
| 3. | Install MICC cable | 3.51 | 0.69 | Required |
| 4. | Carryout duct wiring | 3.60 | 0.57 | Required |
| 5. | Carryout different types of duct wiring | 2.94 | 0.94 | Required |
| 6. | Uses appropriate tools for duct wiring | 2.75 | 0.97 | Required |
| 7. | Joining trunking | 3.07 | 0.98 | Required |
| 8. | Running earth continuity on ducting and trunking | 3.36 | 0.86 | Required |
| 9. | Lifting and mounting of machines. | 2.00 | 0.76 | Not required |
| 10. | Differentiate between motor and generators | 3.78 | 0.56 | Required |
| 11. | Understanding the use of starter for electrical motors | 2.96 | 0.74 | Required |
| 12. | Make use of star-delta-star connections | 2.49 | 0.76 | Not required |

The result of the analysis indicated in table 2 above revealed that the graduate of Electrical Installation and Maintenance Work EIMW in yobe State Science and Technical College required 10 of the listed

skills except 2 with are lifting and mounting machines and making use of star-delta-star connection for self-employment in Industrial Installation after graduation.

Table 3: Mean Responses of the Respondents on the Skills Required In Winding of Electrical Machines.

| S/N | ITEMS | X | S.D | REMARKS |
|-----|--|------|------|----------|
| 1. | Follow regulation on the use of tools. | 3.76 | 0.53 | Required |
| 2. | Select the tools to be use in winding work | 3.57 | 0.57 | Required |
| 3. | Draw procedures for wave winding | 3.00 | 0.61 | Required |
| 4. | Applying lap winding. | 2.96 | 0.88 | Required |
| 5. | Identify front and back shields. | 3.14 | 0.76 | Required |
| 6. | Prepare winding formers. | 3.00 | 0.61 | Required |
| 7. | Prepare winding coil | 3.07 | 0.98 | Required |
| 8. | Fix the winding coil in the slots ensuring that the slots are properly insulated | 3.00 | 0.61 | Required |
| 9. | Test continuity and earthing | 2.98 | 0.94 | Required |
| 10. | Applying vanish and dry in oven | 3.23 | 0.71 | Required |
| 11. | Appling grease to the appropriate parts | 3.86 | 0.36 | Required |
| 12. | Test voltage and current with voltmeter and ammeter respectively | 3.61 | 0.57 | Required |
| 13. | Assemble the machine systematically | 2.78 | 0.80 | Required |



The result in table 3 above also revealed that the graduate of Electrical Installation and Maintenance Work EIMW in Yobe State Science Technical Colleges required all the 13 skills for self-employment in Winding of Electrical machine after their graduation.

FINDING OF THE STUDY

The following are the findings of the study,

1. The graduates of Electrical Installation and Maintenance Work in Yobe State Science and Technical Colleges need all the twenty two skills listed for self-employment in Domestic Electrical Installation.
2. Out of the twelve (12) skills listed for self –employment in Industrials Electrical Installation by the graduates of Electrical Installation and Maintenance Work in Yobe State Science and Technical Colleges only two items (9 and 12) where not required.
3. Thirteen skills are all required by the graduates of Science and Technical Colleges for self-employment in winding of Electrical Machines.

DISCUSSION OF FINDINGS

The findings of the study were discussed in order of the three research questions raised in the study. The findings related to research questions one revealed that twenty two (22) skills are required by the graduates of electrical installation and maintenance work in Yobe State technical colleges for self-employment in domestic electrical installation. This implies that the graduates need all these skills which goes in agreement with the findings of Nwokike (2014) on the skills need for self-employment in Enugu State.

The study revealed that, out of the twelve (12) skills listed for self –employment in Industrials Electrical Installation by the

graduates of Electrical Installation and Maintenance Work in Yobe State Science and Technical Colleges only two items (9 and 12) where not required by the graduates for self-employment. This finding is in agreement with Mbaga (2011) which reported that on completion of the training the trainee should be able to identify/describe the installation of different types of ducts and trunking and Applying all relevant regulations and safety precautions

The study also revealed that, all the thirteen skills are all required by the Yobe State graduates of Science and Technical Colleges for self- employment in winding of Electrical Machines. The findings is in line with NABTED (2011)which outline, On completion of the training, the trainee should be able to: Apply all IEE statutory regulations during electrical winding work; identify and select appropriate tools and equipment used for electrical winding jobs; display skills for dismantling electrical machines for rewinding; demonstrate skills for dismantling machines for rewinding; carryout rewinding of burnt static / rotating electrical machines; explain skimming / undercutting of armature, commutators and slip ring of electrical machines; rewinding of machines and equipment and test for winding continuity, insulation,

CONCLUSION

Based on the findings of the study, the following conclusions were drawn;

There are many unemployed graduates of electrical installation and maintenance work from Yobe State science and technical colleges due to lack of electrical installation and maintenance work skills which covers skills in domestic electrical installation, industrial electrical installation and winding of electrical machines among others. The study therefore, finds out that there is the need for the graduates to acquire such skills for self-employment in Yobe State.



RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made;

1. All the relevant machines, equipment and tools needed for such skills acquisition in electrical installation and maintenance work should be provided in all the eight (8) technical colleges of Yobe State.
2. Teachers and instructors of electrical installation and maintenance work should be given additional training by the government on the implementation of the skills identified for self-employment in both domestic installation, industrial installation and winding of electrical machines.
3. The graduates should be encouraged to embark on self-employment using identified skills in domestic installation, industrial installation and winding of electrical machines
4. The identified skills required for self-employment in electrical installation and maintenance work should be integrated into the programme of the skills acquisition centres (Best centres) across Yobe State.

REFERENCES

- Adamaechi, B.C. & Romaine, H. A. (2000). *Issues, Problems, Prospects of Free Compulsory and Qualitative Education in Nigeria*. Onitsha; Nigerian Educational Publishers.
- Aina, O. (1998). *Poverty Alleviation in Nigeria through Vocational and Technical Education in the 26th Century*. Abeokuta.
- Mbaga, V. E. (2011). Retraining Needs of Electrical Installation and Maintenance Works Trade Teachers in Technical Colleges in North-Eastern Nigeria. *Doctoral thesis*, Modibbo Adama University of Technology Yola.
- Micheal, F. M. (2004). *Social and Personality Development*. Onitsha; African-FEP Publishers.
- Mshelbwala, P. Z. (2008). Delivery of Domestic and Industrial Installation Course in Nigerian Colleges; Problems and prospects. *The Journal of Nigeria Association of Technology Teachers*, vol. 6. November. P47.
- National Business and Technical Examinations Board, (2006). *Syllabuses for Electrical Installation Trades Examination*. Benin, NABTEB.
- Ndu, A. N. (2000). *Educational and Employment; the need for Educational Reform in Nigeria*. In J O. Fadipe & E. E. Oluchuku (Eds.). *Educational Planning and Administrations in Nigeria in the 21st century*. Ibadan; Daily Graphic Ltd.
- Okoro, O. M. (2006). *Principles and Methods in Vocational and Technical Education*. Enugu; University Trust Publishers.
- Olaitan, S. O., Nwachukwu, C. E., Igbo, C.A., Onyemachi, G. A., & Ekong, A. O. (1999) *Curriculum Development and Management in Vocational Technical Education*. Owerri; Cape Publishers International Ltd.
- Oyebode, S. A. (2005). Education and Unemployment of Youths in Nigeria; Causes, Impacts and Suggestions. *Contemporary issues in Educational Management*.
- Terrel, C. (2004). *Winding of Electrical Machines*. McGraw Hill, New York.