ELECTRICAL INSTALLATION AND MAINTENANCE PRACTICE FOR WORK SKILLS IMPROVEMENT NEEDS OF TECHNICAL COLLEGE GRADUATES FOR EMPLOYMENT IN RIVERS STATE

By

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Abstract

The study was carried out to determine important needs of technical Colleges graduate for employment in Rivers State. Three research questions guided the study. Survey research design was employed for the study. The population for the study was 60 graduates of electrical installation and maintenance practice from industries in Rivers State. A structured questionnaire was developed by the researcher for collecting data from the respondents. Split half method was adopted to determine the internal consistency of the questionnaire items, a reliability coefficient of the instrument was calculated to be 0.88. The sixty copies of the instrument administered were retrieved and analyzed using weighted mean and improvement Need Index (IN). The study revealed that graduates of technical Colleges need improvement in identified skills in Electrical Installation and Maintenance Practice for employment in Rivers State. Consequently, the study recommended the review of the curriculum by the National Board for Technical Education (NBTE).

Technical Colleges are post primary schools, where students learn skills in various occupations.

According to Bakare (2006), Technical Colleges are charged with the production of craftsmen and technicians. Akpan (2003) said that technical Colleges are designed to prepare individuals to acquire practical skills, basic scientific knowledge and attitude required as craftsmen and technicians at sub-professional levels. Okoro (2006) said they are regarded as the principal Vocational Institutions in Nigeria that give full vocational training intended to prepare students for entry into various occupations as operatives or artisans and craftsmen. Graduates who undergo training in Electrical Installation and Maintenance Practice are expected to possess work skills for success in
Installation of electrical machines and equipment, maintenance of machines and equipment, winding of Electrical machines, testing and inspection of electrical Installations, repair of electrical machines, etc. but graduates of technical Colleges in Rivers State may have acquired little or no skills in Electrical Installation and Maintenance Practice as observed by the researcher. Most of them have remained jobless because of their deficient skills. They find it difficult to set up their own workshops or to be employed by Electrical Industries in the State.

Electrical Installation and maintenance Practice is one of the trades offered in technical Colleges. It is a Vocational trade that exposes students to skills. According to Wikipedia (2012) Electrical Installation and Maintenance Practice is a programme introduced by way of practical exercise, the maintenance of electrical system and circuits, electrical Installation, Inspection and test procedure. National Board for Technical Education (NBTE) (2004) Electrical craftsmen are expected to test, diagnose, service, install and completely repair any fault on electrical machines and equipment using the manufacturer’s manual. In the report of NBTE (2004) the aim of Electrical Installation and Maintenance Practice is to give training and impart the necessary skills leading to the production of craftsmen, technicians and other skilled personnel who will be enterprising and self reliant.

Improvement is the process of making something better than before. Improvement according to Olaitan, Amusa and Azouzu (2010) is the ability or condition for becoming better than before. Improvement in this study, is a process of helping graduates of technical Colleges in Rivers State acquire higher proficiency level and work skills in Electrical Installation and maintenance practice for greater efficiency. For work to be done requires energy and skills. Skills according to Michael (2004) is an individual’s capability to control elements of behavior, thinking and feeling within specified context and within particular task domains.

Employment according to Wiki Pedia (2010) means working for one’s self or an employer. To be employed, an individual needs to be highly skilled in a trade. To know where graduates of Electrical Installation and Maintenance Practice need improvement, their work skills are necessary to be assessed. It will therefore reveal the level of skills possessed and the areas in which improvement is needed based on their performance gap.

Purpose of the Study

The purpose of the study is therefore to determine the work skills improvement needs of graduates of technical Colleges in Electrical Installation and Maintenance Practice for employment in Rivers State. Specifically the study sought to determine:

- Work skills improvement needs of graduates in Installation of electrical machines and equipment.
- Work skills improvement needs of graduates in Maintenance of electrical machines and equipment.
Work skills improvement needs of graduates in winding of electrical machines.

**Research Questions**

The following research questions were used for this study.
- What are the work skills improvement needs of graduates in Installation of electrical machines and equipment?
- What are the work skills improvement needs of graduates in maintenance of electrical machines and equipment?
- What are the work skills improvement needs of graduates in winding of electrical machines?

**Methodology**

The population of this study consists of sixty graduates of electrical installation and maintenance practice from technical Colleges in Rivers State of Nigeria. Three research questions were developed for the study. The study adopted survey research design. The instrument for data collection was a structured questionnaire that contained 30 work skill items. The questionnaire was divided into two categories of needed and performance.

The needed category has 4 point response of highly needed, averagely needed, slightly needed and not needed; while the performance category also has 4 point response scale of highly performance, average performance, low performance and no performance with a corresponding value of 4, 3, 2 and 1 for the two groups of scale respectively. The instrument was subjected to face validation by three experts from the school of Technical Educational, Federal College of Education (Tech.) Omoku, Rivers State.

Split half method was used to determine the internal consistency of the Instrument with a reliability coefficient of 0.88. Sixty copies of the 30 items questionnaire were administered by the researchers through the help of research assistants on the graduates in the study area with a two days interval for the completion of the questionnaire. The entire sixty copies of the questionnaire administered were retrieved and analyzed.

Weighted mean and improvement needed index (INI) were used in analyzing data from the questionnaire items in order to answer the research questions. The improvement needs was determine as follows.

The mean (Xn) of the needed group was determined for each item.
The mean (Xp) of the performance group was also determined for each item.
The performance gap (Pg) was therefore determined by finding the difference between Xn and Xp for each item, that is PG = Xn - Xp
**Pristine**

a. Where the value of PG is positive (+), it means improvement is needed because, the level at which the graduates were performing in electrical installation and maintenance practice is lower than what is expected.

b. Where the PG is negative (-), it means improvement is not needed because, the graduates of electrical installation and maintenance practice are performing the operations of the item more than what is required.

c. Where the PG value is zero (0), it means improvement is not also needed because, the level at which the graduates were performing in electrical installation and maintenance practice item is equal to the level that was needed.

Each questionnaire was assigned a four point response scale of strongly needed, averagely needed, slightly needed and not needed with values of 4, 3, 2 and 1

**Presentation of Results**

Results of the data analyzed for the study were presented according to the research questions.

**Research Question 1**

What are the work skills improvement needs of graduates in Installation of electrical machines and equipment?

Data for answering research question 1 are presented in table 1.

**Table 1: Performance Gap Analysis (PGA) of the Mean Ratings of Electrical Installation and Maintenance Practice. Graduates on Work Skills Improvement Needs in Installation of Electrical Machines and Equipment.**

<table>
<thead>
<tr>
<th>S/ N</th>
<th>Item Statement</th>
<th>Xn</th>
<th>Xp</th>
<th>PG = Xn-Xp</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Take into consideration the IEE regulation required for the Installation of electrical machines</td>
<td>3.06</td>
<td>1.86</td>
<td>1.20</td>
<td>IN</td>
</tr>
<tr>
<td>2</td>
<td>Make accurate sketches and drawings of the electric circuit for Installation</td>
<td>2.92</td>
<td>2.20</td>
<td>0.72</td>
<td>&quot;</td>
</tr>
<tr>
<td>3</td>
<td>Select appropriate electrical component to be used for the Installation</td>
<td>3.33</td>
<td>1.96</td>
<td>1.27</td>
<td>&quot;</td>
</tr>
<tr>
<td>4</td>
<td>Select appropriate tools and equipment for installation of the electrical machines</td>
<td>3.20</td>
<td>2.41</td>
<td>0.79</td>
<td>&quot;</td>
</tr>
<tr>
<td>5</td>
<td>Mount the electrical machines at the required points.</td>
<td>3.00</td>
<td>1.95</td>
<td>1.05</td>
<td>&quot;</td>
</tr>
<tr>
<td>6</td>
<td>Connect wires correctly</td>
<td>2.93</td>
<td>1.95</td>
<td>0.98</td>
<td>&quot;</td>
</tr>
<tr>
<td>7</td>
<td>Use suitable earthing system to prevent electric shock</td>
<td>3.26</td>
<td>1.98</td>
<td>1.28</td>
<td>&quot;</td>
</tr>
<tr>
<td>8</td>
<td>Connect suitable protective devices such as fuses and circuit breakers</td>
<td>2.93</td>
<td>2.00</td>
<td>0.93</td>
<td>&quot;</td>
</tr>
<tr>
<td>9</td>
<td>Assemble parts of machines correctly</td>
<td>2.95</td>
<td>2.16</td>
<td>0.79</td>
<td>&quot;</td>
</tr>
<tr>
<td>10</td>
<td>Carry out relevant test such as continuity test,</td>
<td>3.30</td>
<td>2.20</td>
<td>1.10</td>
<td>IN</td>
</tr>
</tbody>
</table>
earth leakage test before installation is energized.

Table 1 revealed that the performance gap of 10 work skill items are positive and ranged from 1.10 to 1.20. This indicates that the graduates need improvement in 10 work skills items in installation of electric machines and equipment. In general, the result revealed that graduates of electrical installation and maintenance practice from technical Colleges need improvement in work skills for installation of electric machines and equipment for employment.

**Research Questions 2:**
What are the work skills improvement need of graduates in maintenance of electrical machines and equipment?

The data for answering research question 2 are presented in Table 2.

**Table 2: Performance Gap Analysis (PGA) of the Mean Ratings of Electrical Installation and Maintenance Practice Graduates on Work Skills Improvement Needs in the Maintenance of Electrical Machines and Equipment.**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Item Statement</th>
<th>Xn</th>
<th>Xp</th>
<th>PG = Xn-Xp</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Locate faults in the electrical machines using appropriate tools and equipment</td>
<td>3.98</td>
<td>2.01</td>
<td>0.97</td>
<td>IN</td>
</tr>
<tr>
<td>2.</td>
<td>Remove faulty units from the machine for servicing</td>
<td>3.03</td>
<td>2.25</td>
<td>0.78</td>
<td>“</td>
</tr>
<tr>
<td>3.</td>
<td>Use appropriate tools and equipment for a particular operation on the electric machine</td>
<td>2.75</td>
<td>1.66</td>
<td>1.09</td>
<td>“</td>
</tr>
<tr>
<td>4.</td>
<td>Dismantle faulty unit correctly</td>
<td>2.82</td>
<td>1.66</td>
<td>1.16</td>
<td>“</td>
</tr>
<tr>
<td>5.</td>
<td>Identify the bad component</td>
<td>2.96</td>
<td>1.86</td>
<td>1.10</td>
<td>“</td>
</tr>
<tr>
<td>6.</td>
<td>Carry out preventive and corrective maintenance correctly.</td>
<td>3.42</td>
<td>2.35</td>
<td>1.07</td>
<td>“</td>
</tr>
<tr>
<td>7.</td>
<td>Inspect, repair and replace the faulty component</td>
<td>3.05</td>
<td>1.83</td>
<td>1.22</td>
<td>“</td>
</tr>
<tr>
<td>8.</td>
<td>Use the correct grade of lubricant to lubricate moving parts of the machine</td>
<td>3.83</td>
<td>1.93</td>
<td>1.90</td>
<td>“</td>
</tr>
<tr>
<td>9.</td>
<td>Connect all wired and protective devices correctly</td>
<td>3.20</td>
<td>2.20</td>
<td>1.00</td>
<td>“</td>
</tr>
<tr>
<td>10.</td>
<td>Conduct proper test to ensure that the maintenance parts of machines are in good working condition</td>
<td>2.80</td>
<td>2.17</td>
<td>0.63</td>
<td>IN</td>
</tr>
</tbody>
</table>

Table 2 revealed that the performance gaps of the ten work skills items ranged from 0.63 to 0.97. All the performance gap values are positive indicating that the graduates need improvement in work skill items for maintenance of electrical machines and equipment for employment.

**Research Question 3**
What are the work skills improvement needs of graduates in winding of electrical machines?
The data for answering research questions 3 are presented in Table 3

**Table 3 Performance Gap Analysis (PGA) of the Mean Rating of Electrical Installation and Maintenance Practice. Graduates on Work Skills Improvement Needs in Winding of Electrical Machines.**

<table>
<thead>
<tr>
<th>S/N</th>
<th>Item Statement</th>
<th>Xn</th>
<th>Xp</th>
<th>PG = Xn-Xp</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Select appropriate tools and equipment for rewinding electrical machines</td>
<td>3.30</td>
<td>2.03</td>
<td>1.27</td>
<td>IN</td>
</tr>
<tr>
<td>2.</td>
<td>Dismantle the machine and identify the front and the back shield.</td>
<td>3.28</td>
<td>2.36</td>
<td>0.92</td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>Carefully observe and develop the winding diagram of the electric machine</td>
<td>3.06</td>
<td>1.75</td>
<td>1.31</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>Remove the burnt coils from the machine and count the coils per slot properly</td>
<td>3.10</td>
<td>2.16</td>
<td>0.94</td>
<td></td>
</tr>
<tr>
<td>5.</td>
<td>Perform proper insulation of the slots using suitable insulation material.</td>
<td>3.00</td>
<td>1.92</td>
<td>1.08</td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Replace the windings, using the required wire gauge of wires.</td>
<td>3.26</td>
<td>1.70</td>
<td>1.56</td>
<td></td>
</tr>
<tr>
<td>7.</td>
<td>Use proper varnish on the wound coils</td>
<td>2.90</td>
<td>2.30</td>
<td>0.60</td>
<td></td>
</tr>
<tr>
<td>8.</td>
<td>Check brush positions</td>
<td>3.05</td>
<td>1.90</td>
<td>1.15</td>
<td></td>
</tr>
<tr>
<td>9.</td>
<td>Test the rewound electrical machine for performance</td>
<td>2.95</td>
<td>1.86</td>
<td>0.09</td>
<td></td>
</tr>
<tr>
<td>10.</td>
<td>Assemble the parts of the machine properly</td>
<td>2.98</td>
<td>2.16</td>
<td>0.82</td>
<td>IN</td>
</tr>
</tbody>
</table>

Table 3 Revealed that the performance gaps of all the ten (10) work skill items ranged from 0.82 to 1.27. All the performance gap values are positive indicating that the graduates need improvement in work skills items for winding of electrical machines for employment.

**Discussion of Results**

The result of the study revealed that the graduates of electrical installation and maintenance practice from technical Colleges in Rivers State need improvement in work skills for installation of electric machines and equipment, maintenance of electric machines and equipment and winding of electric machines in order to be employed. The above results agreed with the findings of Akinduro (2006) who conducted a study on electrical installation work skills needed by technical Colleges graduates to enhance their employment in Ondo State where he found out that graduates require various work skills in domestic and industrial installation, cable joint, battery charging etc for employment after graduation. The findings of this study are also in line with the findings of Bakare (2006) who carried out a study on safety practice skills needed by electrical/electronics students of Technical Colleges in Ekiti State. The researcher found out that students in electrical-electronics department need safety practice skills while using hand tools, power tools, operating on machines, working in electrical workshop and also using instruction manuals.
Conclusion

Based on the results of this study, the following conclusions were made:

Graduates of electrical Installation and Maintenance Practice needed improvement for work skills in order to:

1. Service and repair electrical machines and equipment
2. Install electrical machines and equipment
3. Trace electrical faults
4. Maintain electrical machines
5. Dismantle and wind electrical machines

Recommendation

The following recommendations have been made based on the findings and conclusions made in this study.

1. The curriculum of the identified work skills should be reviewed by the National Board for Technical Education.
2. Emphasis should be placed on practicals while as a student
3. Electrical workshop and equipment should be functional in order to sustain the interest of the students before graduating.
4. Graduates of electrical Installation and Maintenance Practice to be on the job-training when employed

References


