
LEVEL OF SKILLS ACQUIRED AND JOB PERFORMANCE OF GRADUATES OF TECHNICAL COLLEGES IN WINDING OF ELECTRICAL MACHINES IN NORTH EASTERN NIGERIA

By

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ABSTRACT

In order to provide solutions to the persistent shortages of adequate middle level manpower in Nigeria, this study was conducted to determine level of skills acquired and job performance of graduates of electrical installation and maintenance work (EIM) trade of technical colleges in winding of electrical machines in north eastern Nigeria. The study was guided by two research questions and one hypothesis. Descriptive survey research design based on core self-evaluation was used for the study. The population of the was 395 consisting of 313 graduate of electrical installation and maintenance work trade and 82 work place supervisors in 33 public establishment in north eastern Nigeria. The entire population was used for the study. Two sets of structured questionnaires were used for data collection. Each of the questionnaires has 25 items in six task clusters. The instrument was face and content validated by three electrical technology lecturers form Modibbo Adama University of Technology, Yola and three EIM teachers and workshop based supervisor each from government science and technical college and federal ministry of works and Jos respectively. The entire validated instrument was tested for internal consistence using the cronbach Alpha method which yielded a pulled reliability coefficient of 0.85. The data for the study were analyzed using the mean, mean of means and z-test statistical methods using the Microsoft excel for windows. The study found out that graduate of electrical installation and maintenance works trade of technical colleges in north eastern Nigeria Highly acquired skills in winding of electrical machines. While the graduates exhibited moderate level of job performance in windings of electrical machines, there was no significance difference in the mean response of graduates and supervisor on level of job performance of graduates in winding of electrical machines module. The study therefore recommended among others that employers should organize workplace refresher training for graduates on armature windings, commutator and slip rings tasks to enable the EIM graduates practice and acquire relevant skills in the area

Key words: *Windings, Electrical Machines, Skills Acquired, Job Performance, Graduates, Supervisors*

INTRODUCTION

The increasing complexities of industrial development and production have created new requirements for technical personnel much more rapidly than our educational system has been able to adjust to meet these needs. Consequently, the development of sound technical and vocational

education (TVE) is central to the nation's desire of becoming industrialized and self-reliant. However, present realities in Nigeria indicate that it will take more than a mere refocusing of technical education in its present format to make it more relevant, responsive and effective in delivering graduates with

requisite skills and training that can perform to the satisfaction of their employers (Osborn, 2006).

In most key sectors of the economy in Nigeria, middle level manpower shortages persist and the country remains over-dependent on the skills of expatriates (Atsumbe, 2002). A clear indication that something vital is missing from the graduates of our middle schools; technical colleges inclusive. In countries like Ghana, Britain, Cote d'Ivoire and Nigeria, there is a considerable gap between what is learned in the classroom and the real-life context of students' present or future world of work (Anamuah-Mensah and Towse, 1995; Stevenson, 1995; Muskin, 1997; Tabron and Yang, 1997).

Recognizing that an accelerated programme of human resource development was necessary to enable Nigerians to meet the challenges of the contemporary world of work, the Government of the Federal Republic of Nigeria in the year 2000 invited UNESCO to help its Ministry of Education to revitalize the national Technical and Vocational Education and Training (TVET) programme. With generous sponsorship from the Government of Japan, UNESCO responded to this request by launching in January 2001 an intensive programme to upgrade teaching in Nigeria's technical colleges and polytechnics with a view to maximizing the potential of learners to become productive participants in economic and social development (Ajeyalami, 2007). On its part, the Nigerian Government ensured the effectiveness of this exercise by contributing considerable local resources (John, 2003). The project for revitalizing Technical and Vocational Education in Nigeria carried out in the year 2001 was therefore designed to adapt curricula and teaching methods to make them more compatible with the demands of the labour market and to deliver the right kind of training that will give young people appropriate knowledge and skills to satisfactorily function in their various professions or trades and at the same time be flexible enough to allow them adjust to changing demands of our economy (Yakubu, 2003). Seizing the opportunity offered under the UNESCO-

Nigeria TVE revitalization Project, the NBTE, 2007 updated a total of 25 TVE curricula at the National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC) levels for Technical Colleges. Modern concepts and skills, including Information and Communication Technology (ICT), have been incorporated into the curricula. Another major change in the curriculum was the increase in relevant practical classes, which have now been separated from theory and provided with clear facility requirements (Yakubu, 2008).

Electrical Installation and Maintenance Works (EIM) is an engineering trade offered at Technical College level in Nigeria, whose aim is to produce competent craftsmen with sound theoretical knowledge and practical skills that would be able to diagnose faults and carryout repairs/ maintenance on all types of electrical installations (NBTE, 2007). The trade content is divided into five broad modules namely, domestic installation (CEI 12), industrial installation (CEI 13), cable jointing (CEI 14), battery charging (CEI 15) and winding of electric machines (CEI 16) NABTEB (2007).

Before the review of the Technical College Curriculum in 2001, graduates of technical colleges in Oyo state were criticized for being deficient in various practical skills and not performing Maintenance work to the expectation and satisfaction of their employers (Jimoh, 1997). Aliyu (2009) also noted that Electrical Installation and Maintenance works graduates perform below expectations in their various work places. In Kano state where most of the industries in the North are situated, employers decried the low performance of their employees especially those from technical colleges (Adamu, 2009). In response to this situation, the Kano State Government quickly initiated a strategy with emphasis on providing context facilities for manpower training in technical disciplines. Despite the various interventions to ensure that technical college graduates are well equipped with the requisite practical skills for the job market and the campaign about the benefits of technical and vocational

education, it has not yielded results because most technical college graduates have not been able to enter into employment in their respective fields of training due largely to deficiency in some skill areas (Akplu & Amankrah, 2008).

Adamu (2009) observed that products of the nation's technical colleges are of poor quality as a result of mismatch between skills acquired in school and work place job description. The reason why Electrical Installation and Maintenance Works was selected in which master trainers are being trained in Adamawa State was that, graduates of the trade were found under performing and as a result, the level of unemployment in Adamawa State especially among the youths is very high (UNDP, 2009). Uwaifu (2009) reported that technical college Electrical Installation and Maintenance Works graduates show strong relationship between occupational task performance in basic skills such as in electrical domestic installation and safety. According to Uwaifu (2009) the performance of graduates in higher skill areas is low.

The expectation of the graduates is to gain employment in industries, establish a repair/Maintenance/installation shop or go for further studies in Electrical occupations at higher level. However, Akplu and Amankrah (2010) observed that graduates of technical colleges lack the requisite practical skills for the world of work and, in most cases; such graduates are retrained before being employed. Graduates of technical colleges in Nigeria therefore find themselves in jobs for which they have had no previous training or have not acquired skills for. Akpan (2004) and Akinduro (2006) in their separate studies agreed that graduates of electrical installation and maintenance works trade of technical colleges in Nigeria acquired little skills from technical colleges. Aliyu (2009) also observed that graduates of Technical College Electrical Installation and Maintenance Works (EIM) lack practical skills to enable them set up repair/maintenance/installation shops and do not carry out maintenance work (job

performance) to the expectations and satisfaction of their employers.

Though technical colleges in the North-Eastern region of Nigeria have been graduating craftsmen in Electrical Installation and Maintenance Works, these graduates neither set up their own workshops nor are they employed by relevant industries due to low level of skills acquired by these graduates while in school. In some cases where the graduates get employed, their employers complain of low job performance. Therefore, it became pertinent for this study to determine level of skills acquired and job performance of the graduates of EIM in North Eastern Nigeria in order to provide information that will help solve the low level of skills acquisition and job performance of the EIM graduates.

Purpose of the Study

The purpose of this study was to determine level of Skills Acquired and Job Performance of Graduates of Electrical Installation and Maintenance Works Trade of Technical Colleges in North Eastern Nigeria in Winding of Electrical Machines. Specifically, the study sought to determine:

1. Level of skills acquired in winding of electrical machines by graduates of Electrical Installation and Maintenance Works Trade of Technical Colleges in North Eastern Nigeria
2. Level of job performance of graduates of Electrical Installation and Maintenance Works Trade of Technical Colleges in winding of electrical machines
3. Difference in the mean ratings of graduates of Electrical Installation and Maintenance Works and their supervisors on the job performance of graduates in winding of electrical machines

Research Questions

The following research questions guided the study:

1. What is the level of skills acquired by graduates of electrical installation and maintenance works trade of technical

- colleges in winding of electrical machines in North Eastern Nigeria?
2. What is the level of job performance of graduates of electrical installation and maintenance works trade of technical colleges in winding of electrical machines in North Eastern Nigeria?

Hypothesis

One hypothesis was formulated to guide the study as follows.

H₀₁ There is no significant difference between the mean ratings of graduates of electrical installation and maintenance works trade of technical colleges and their supervisors on the job performance of graduates in winding of electrical machines in North Eastern Nigeria.

METHODOLOGY

The research design employed for this study was descriptive survey research design. According to Sambo (2005), a descriptive survey is an assessment of present state of affairs usually carried out through questionnaires, opinions and interviews. The design was suitable for the study since it elicited information from graduates on core self-evaluation (Bono & Judge, 2003) and their workplace supervisors on level of skills acquired and job performance of graduates of technical college electrical installation and maintenance works trade.

The study was conducted in the Northeast Geopolitical zone of Nigeria comprising Adamawa, Bauchi, Borno, Gombe, Taraba and Yobe States. The North-Eastern Nigeria lies between Latitude 6° 18' to 14° 32' N and Longitude 10° 11' to 14° 35' E (Mohammed, 1999).

The population for the study was the technical college electrical installation and maintenance work graduates and electrical installation and maintenance workplace-based supervisors that are working in public sectors in North Eastern Nigeria. Since the population of EIM graduates was 313 and that

of their supervisors was 82, the whole population was used for the study. Hence, there was no sampling.

Two sets of structured questionnaires developed by the researcher were used for data collection. The questionnaires were developed using National Business and Technical Examination Board (NABTEB) syllabus, (FRN, 2007) for Technical College Electrical Installation and Maintenance Works Trade and other related literatures. The first set of the questionnaire titled "Winding of Electrical Machines Skill Acquired Questionnaire (WEMSAQ)" was administered on the graduates to rate level of skills they acquired" The second set of a questionnaire titled "Winding of Electrical Machines Job Performance Questionnaire (WEMJPQ)" was administered on both the graduates and their workplace supervisors to rate level of job performance of the graduates. Each of the instruments has 25 items in six task clusters. Section A of both instruments elicited information on respondents' bio data, while, section B of the first instrument which covered level of skills acquired was administered on the EIM graduates with a response pattern for level of skills acquired by the graduates denoted by Excellently Acquired (5), Highly Acquired (4), Moderately Acquired (3), Slightly Acquired (2), and Not Acquired (1), section B of the second set of the instrument had similar structure and description except in the response pattern was administered on the graduates and their workplace supervisors. This section of the instrument has the response pattern of Excellent Performance (5), High Performance (4), Moderate Performance (3), Low Performance (2) and Poor Performance (1) for level of job performance.

The instruments were face and content validated by three (3) electrical technology education lecturers from Modibbo Adama University of Technology, Yola, Adamawa State, Nigeria. Also, three (3) EIM teachers and workshop based supervisors each from Government Science and Technical College and Federal Ministry of Works Jos, Plateau State, Nigeria respectively, were used in the validation of the instruments. After considering the validates'

judgments and observations of the items, a final copy of the instrument emerged in a six-categorized task cluster consisting of 25 task items in six task clusters.

The researcher with the help of two industry based assistants administered the instruments through a trial test to 20 graduates of technical college electrical installation and maintenance works, and 10 workshop-based supervisors in Plateau State, Nigeria Ministries of Works and Rural Development respectively. The instruments were administered once on the respondents and the Cronbach alpha reliability formula was used to determine the coefficient of reliability (r) of the instruments. The pulled reliability coefficient of the instruments was 0.85.

The researcher with the help of 12 industry based assistants collected data using the first instrument (WEMSAQ). The instrument was first administered on all the EIM graduates in the thirty-three (33) establishments in North Eastern Nigeria. The graduates initially responded by indicating the level of skills they acquired on the 25 tasks items in six task clusters. The other instrument (WEMJPQ) was

then administered to the graduates and their work place supervisors respectively.

Mean statistic and mean of means were used to answer the two research questions, while standard deviation was used to determine the extent of homogeneity of the responses of the respondents. The description of all the task items was based on upper and lower limits of real numbers. Z-test inferential statistic was used to test the null hypothesis at 0.05 level of significance. The analysis was done using Microsoft Excel for windows.

RESULTS

Results obtained were presented based on the research questions and hypothesis that guided the study.

Research Question 1: What is the level of skills acquired by graduates of electrical installation and maintenance works trade of technical colleges in winding of electrical machines in North Eastern Nigeria?

Table 1: Mean ratings of graduates of EIM on level of skills acquired in windings of electrical machines

S/N	Industrial Installation Module (CEI 12)	N=313	\bar{X}	SD	Remarks
Cluster 1: Tools and Equipment					
1	Identify tools/equipment used in winding electrical machines		4.93	1.55	EA
2	Correct selection tools/equipment		3.65	1.88	HA
			4.24	1.72	HA
Cluster 2: Winding Drawings					
3	Ability to prepare different types of winding drawings		3.95	1.95	HA
4	Ability to interpret different types of winding drawings		3.85	1.24	HA
5	Ability to apply different types of winding drawings		3.64	0.57	HA
			3.84	1.25	HA
Cluster 3: Dismantling					
6	Recording necessary data from main plate		4.60	0.96	EA
7	Ability to dismantle machines for rewinding using extractor		4.67	1.15	EA
8	Ability to assemble machines using appropriate tools		4.63	1.58	EA
9.	Ability to locate position of brushes		4.54	1.54	EA
			4.61	1.31	HA
Cluster 4: Rewinding of Machines					
10	Ability to differentiate types of conductors used in winding		4.88	1.82	EA

11	Proper identification of classes of insulating materials	4.77	1.67	EA	
12	Ability to fix winding coils in their slots	4.52	1.28	EA	
13	Ability to use of prepared data to connect winding	4.63	1.23	EA	
14	Ability to apply varnish	4.95	1.55	EA	
15	Ability to carry out tests on completed winding work	4.60	0.97	NA	
		4.70	1.42	EA	
Cluster 5: Armature, Commutator and Slip Ring					
16	Ability to determine coil span per pitch, per phase, per pole	1.71	0.87	SA	
17	Ability to position coil ends on commutator/slip rings for fixed brush in a winding diagram	1.84	0.65	SA	
18	Ability to skim/undercut armature/ commutator/slip ring	2.52	0.74	MA	
		2.02	0.75	SA	
Cluster 6: Final Inspection and Testing					
19	Ability to identify different winding paths by inspection	3.17	1.05	MA	
20	detect bad ball bearing		1.29	1.02	SA
21	Ability to fix end shield in their proper positions	2.44	1.06	SA	
22	Proper application of grease to the appropriate machine parts	4.48	1.56	HA	
23	Use of megger to test continuity/ insulation resistance of a machine	3.52	1.16	HA	
24	Ability to carry out test-run of machine ensuring correct rotation	3.66	0.69	HA	
25	Conducting appropriate tests to manufacturers specification	3.17	0.85	MA	
		3.10	1.06	MA	
	Grand Mean	3.83		HA	

\bar{X} = Mean rating of graduates of EIM, σ = standard deviation, N = Number of graduates of EIM, EA = Excellently Acquired, HA = Highly Acquired, MA = Moderately Acquired, SA = Slightly Acquired, NA = Not Acquired

Table 1 showed the level of skills acquired in winding of electrical machines by graduates of electrical installation and maintenance works (EIM) trade of technical colleges in North Eastern Nigeria. The table revealed that EIM graduates highly acquired skills in three task clusters: tools and equipment, dismantling and winding drawings with means ranging from 3.84 to 4.61.

The graduates moderately acquired skills in cluster 6; final inspection and testing with means value of 3.10. Mean ratings of skills in rewinding of machines, revealed that the EIM graduates excellently acquired skills in the task cluster with mean of 4.70. Mean of 2.02 in armature, commutator and slip ring (cluster 5), showed that the graduates slightly acquired skills in the cluster.

Research Question 2: What is the level of job performance of graduates of electrical installation and maintenance works trade of technical colleges in winding of electrical machines in North Eastern Nigeria?

Table 2: Mean ratings of graduates of EIM and supervisors on level of job performance of graduates in winding of electrical machines

S/N	Domestic Installation Module (CEI 12)	n ₁ =313		n ₂ = 82		N _T =395	
		\bar{X}_1	SD ₁	\bar{X}_2	SD ₂	\bar{X}_G	Rmks
Cluster 1: Tools and Equipment							
1	Identify tools/equipment used in winding electrical machines	3.98	0.82	3.83	1.07	3.94	HP
2	Correct selection tools/equipment	3.48	0.89	3.29	1.05	3.44	MP
						3.69	HP
Cluster 2: Winding Drawings							
3	Ability to prepare different types of winding drawings	3.29	1.25	3.19	1.21	3.27	MP
4	Ability to interpret different types of winding drawings	3.38	1.31	3.33	1.09	3.34	MP
5	Ability to apply different types of winding drawings	3.24	1.04	3.10	1.20	3.21	MP
						3.27	MP
Cluster 3: Dismantling							
6	Recording necessary data from main plate	4.25	1.31	3.85	1.03	4.17	HP
7	Ability to dismantle machines for rewinding using Extractor	4.29	0.72	4.07	1.04	4.24	HP
8	Ability to assemble machines using appropriate tools	4.06	0.49	3.95	1.08	4.03	HP
9.	Ability to locate position of brushes	3.55	1.25	3.29	1.11	3.50	HP
						3.99	HP
Cluster 4: Rewinding of Machines							
10	Ability to differentiate types of conductors used in winding	4.31	0.71	4.20	1.02	4.29	HP
11	Proper identification of classes of insulating materials	4.17	0.83	3.95	0.96	4.12	HP
12	Ability to fix winding coils in their slots	3.71	0.92	3.60	0.57	3.69	HP
13	Ability to use of prepared data to connect winding	3.64	0.45	3.57	1.05	3.63	HP
14	Ability to apply varnish	4.27	1.05	4.03	0.95	4.22	HP
15	Ability to carry out tests on completed winding work	3.67	1.34	3.36	0.88	3.61	HP
						3.93	HP
Cluster 5: Armature, Commutator and Slip Ring							
16	Ability to determine coil span per pitch, per phase, per pole	2.57	1.19	2.52	0.94	2.56	MP
17	Ability to position coil ends on commutator/slip rings for fixed brush in a winding diagram	2.64	1.14	2.57	0.97	2.63	MP
18	Ability to skim/undercut armature/ commutator/slip ring	2.49	1.11	1.81	1.31	2.34	LP
						2.49	LP
Cluster 6: Final Inspection and Testing							
19	Ability to identify different winding paths by inspection	4.52	1.10	4.37	0.77	4.49	HP

20	detect bad ball bearing	2.93	1.07	2.86	1.06	2.91	MP
21	Ability to fix end shield in their proper positions	3.31	1.06	3.19	0.83	3.29	MP
22	Proper application of grease to the appropriate machine						
	Parts	4.45	1.42	4.37	0.84	4.33	HP
23	Use of megger to test continuity/insulation of a machine	2.40	0.87	2.31	0.76	2.38	LP
24	Carry out test-run of machine ensuring correct rotation	3.45	1.02	3.15	1.31	3.39	MP
25	Conducting appropriate tests to manufacturers specification	3.20	1.07	3.11	1.17	3.18	MP
						3.41	MP
	Grand Mean	3.58	1.02	3.40	1.01	3.43	MP

X_1 = Mean rating of graduates of EIM, σ_1 = standard deviation of graduates of EIM, X_2 = Mean rating of supervisors, X_G = Mean of means, σ_2 = standard deviation of supervisors, N_1 = Number of graduates of EIM, N_2 = Number of supervisors, EP = Excellent Performance, HA = High Performance, MA = Moderate Performance, LP = Low Performance

Table 2 showed the level of job performance of graduates of electrical installation and maintenance works (EIM) trade of technical colleges in winding of electrical machines in North Eastern Nigeria. The table revealed that EIM graduates exhibited high level of job performance in three task clusters namely, tools and equipment, dismantling and rewinding of machines having mean values ranging from 3.69 to 3.99.

Mean ratings of job performance in winding drawings and final inspection and testing showed that the EIM graduates exhibited moderate level of job performance in all the two task clusters with means of 3.27 and 3.41 respectively. Mean ratings of job

performance in armature, commutator and slip rings showed that the graduates exhibited low level of job performance in the task cluster with pulled mean value of 2.49.

Hypothesis I

There is no significant difference between the mean ratings of graduates of electrical installation and maintenance works trade of technical colleges and their supervisors on the job performance of graduates in winding of electrical machines in North Eastern Nigeria.

Table 3: z-test analysis of the ratings of graduates and supervisors on level of job performance of graduates in winding of electrical machines

Respondents	\bar{X}	σ	N	SE	Z_{cal}	Z_{crit}	Remarks
EIMWG	3.58	1.02	313	0.12	1.44	1.96	NS
EIMWS	3.40	1.01	82	0.13			

Table 3 showed that the Z_{cal} (1.44) was less than the table value Z_{crit} (1.96) hence the null hypothesis H_0 was accepted indicating that there was no significant difference between the mean ratings of graduates of electrical installation and maintenance works trade of technical colleges and their supervisors on the job performance of graduates in

winding of electrical machines in North Eastern Nigeria.

FINDINGS

Based on the results obtained from the analyzed data, the following findings were deduced about level of skills acquired and job performance of graduates of electrical installation and maintenance works trade of

technical colleges in winding of electrical machines in North Eastern Nigeria. The findings revealed that the EIM graduates:

1. Highly acquired skills in winding of electrical machines; the graduates,
 - i. Highly acquired skills in tools and equipment cluster
 - ii. Highly acquired skills in winding drawings cluster
 - iii. Highly acquired skills in dismantling cluster
 - iv. Excellently acquired skills in rewinding of machines cluster
 - v. Slightly acquired skills in armature, commutator and slip ring cluster
 - vi. Moderately acquired skills in final inspection testing cluster
2. Exhibited moderate job performance in winding of electrical machines; the graduates showed,
 - i. High level of job performance in tools and equipment cluster
 - ii. Moderate level of job performance in winding drawings cluster
 - iii. High level of job performance in dismantling cluster
 - iv. High level of job performance in rewinding of machines cluster
 - v. Low level of job performance in armature, commutator and slip ring cluster
 - vi. Moderate level of job performance in final inspection testing cluster
3. The study found out that there was no significant difference in the mean ratings of graduates and supervisors on the level of job performance of graduates in winding of electrical machines

DISCUSSION

Findings of the study have been discussed based on the pattern of the research questions and hypothesis.

Findings in winding of electrical machines showed that EIM graduates highly acquired skills in the module. This revelation is due to the nature of tasks

within the task clusters in the module. For instance, skills in tools and equipment, working drawings and rewinding are practically not difficult tasks as Moses (2009) in his study also found skill operations by technical college EIM students under this module to be practically simple with reliability coefficients ranging from 0.85 to 0.92. In the light of this finding, Udofia, (2006) opined that graduates of electrical installation and maintenance works should acquire skills necessary to maintain and repair any kind of electrical machines especially in the area of rewinding of burnt windings. This finding was further buttressed by Ibrahim (2010), that windings of electrical machines can be conducted successfully by technical College graduates under concentrated and distributed forms. Findings on dismantling, armature and commutator and final inspection and testing showed that the graduates acquired little skills in these clusters; an indication that teaching facilities in these clusters are in short supply in the technical schools where these graduates were trained (Yaduma & Moses, 2005). This finding slightly differs with the findings of Akplu and Amankrah (2008) on the efficacy of technical programmes which revealed that technical college EIM graduates are retrained before being employed in most industries.

Findings on the level of job performance of graduates of EIM in winding of electrical machines showed that the graduates exhibited moderate job performance in the module. This finding is attributed to the curriculum offerings in windings of electrical machines. Tasks such as dismantling of machines, application of varnish, and maintenance of electrical equipment that are found in tools and equipment, dismantling and rewinding of machines clusters are considered as routine tasks and can be carried out by the graduates. The graduates were also found to exhibit moderate job performance in observing safety regulations regarding windings of electrical machines. This finding agreed with that of Uwaifu (2009) which reported that there is strong relationship between occupational task performance and of graduates of

EIM in skills such as electrical domestic installation and safety.

Findings on the null hypothesis revealed that both EIM graduates and their supervisors agreed that the graduates exhibited moderate level of job performance on tasks in winding of electrical machines. This Finding is slightly in agreement with the findings of Elobuike (1999) which revealed that EIM graduates have adequate skills related to winding of electrical machines and maintenance. EIM graduates performed moderately in this module probably because the high level of skills acquired in this module and due likely to the fact that most machines does not readily develop problems except on routine maintenance and therefore the graduates' attention seems to dwell much on the other tasks such as observation of safety regulations and the mere starting of electrical machines. However, as robust as electrical machines may be, years of service coupled with power fluctuations may cause malfunction in electrical machines (Gupta, 2005).

CONCLUSION

Based on the results of this study as contained in the previous chapter, it can be concluded that graduates of electrical installation and maintenance works trade of technical colleges in North Eastern Nigeria excellently acquired skills in one task cluster, highly acquired skills in two task clusters, moderately acquired skills in two task clusters and slightly acquired skills in one task cluster in the winding of electrical machines module. Graduates of electrical installation and maintenance works trade of technical colleges in North Eastern Nigeria exhibited high level of job performance in three task clusters, moderate level of job performance in two task clusters, low level of job performance in one task cluster.

It can also be concluded that whereas the graduates of electrical installation and maintenance works trade of technical colleges in North Eastern Nigeria highly acquired skills in winding of electrical

machines module of the trade, they exhibited moderate job performance in winding of electrical machines.

RECOMMENDATIONS

Based on the conclusions presented, the following actions appear warranted with regard to the issues addressed by the research questions and hypotheses in this study:

1. Facilities for armature windings, commutator and slip rings should be made available at Technical colleges in North Eastern Nigeria to enable adequate practical skills acquisition by students of IEM
2. Employers are to organize workplace refresher training for graduates on armature windings, commutator and slip rings to enable the EIM graduates practice and acquire relevant skills in the area.
3. EIM graduates need improvement in their job performance in all the tasks in winding of electrical machines since they exhibited moderate level of job performance.

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