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An Appraisal of Technical Skills Possessed by Technical College Auto-Mechanics Graduates in Nigeria

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Abstract
The study was aimed at identifying the level of technical skills possessed by technical college automotive graduates in Auto-Electrical system maintenance and the factors influencing the level of technical skills possessed in auto electrical maintenance. A total of 56 auto-mechanics technical college graduates that are working in Bauchi and Gombe states and their 42 supervisors served as the respondents of the research. Auto-Electrical task cluster from the National Board for Technical Education (NBTE) modular curriculum was used in developing the instrument for data collection (questionnaire). A test-re-test was used in determining the reliability of the instrument and Pearson product moment correlation coefficient was used to compute the reliability coefficient. The instrument had a reliability index of 0.72. Mean was used to answer the research questions and t-test statistics were used to test the hypotheses at 0.05 significant levels. The findings of the study revealed that: technical college auto mechanic graduates exhibited low level of technical skills in auto-electrical maintenance. The use of outdated teaching and learning facilities, teacher's competency, mismatch between curriculum content and needs of industry are the major factors affecting the acquisition of technical skills in auto-electrical system maintenance among auto-mechanics students. It was recommended that real or prototype of modern automobile and up to date equipment and learning facilities should be made available for teaching students in technical colleges, refresher courses be organized for auto mechanic teachers regularly in the auto mobile industry to update their technical skills, Curriculum of auto-mechanics trade should be reviewed on regular basis to reflect the need of the industries and the school learning environment should be a replica of working environment.
Keywords: Technical Skills,Technical College, Auto- Electrical System, Auto -Mechanics Graduates.

Introduction

The quality of technical college graduates has been a major source of concern by most employers in Nigerian labor market. Most employers in Nigeria express their dissatisfaction on the level of technical skills possessed by Technical College graduates. Automotive Mechanics (AM) trade like other engineering professions has witnessed changes and expansion at an accelerated rate in the last three decades. The automobile industry is undergoing rapid technological transformation and is currently faced with increased deregulation, accelerating globalization, and ever-changing consumer tastes. This is in agreement with the views of Dennis (2002) who stated that we are experiencing changes at an increasingly rapid pace in many aspects of our lives, with everything moving fast. Such rapid changes in the workplace are forcing educational systems into a tight corner.

The use of computerized and electronic systems in vehicles has increasingly become an integral part of the process in the automotive industry (Kitainge, 2002). There has been an increase in the production of vehicles with automatic transmission and computerized systems such as transistorized ignition systems, charging and air conditioning. In addition, most cars that are now being produced have drivers' air bags, cruise control, automatic braking system(ABS) , remote locking and auto windows, to mention but a few. On the other hand possession of job specific skills in the automotive trade alone is not enough to guarantee a graduate of obtaining retaining and progressing on the job. This has placed a serious challenge on education, which has the role of equipping learners with the knowledge; attitudes and skills necessary to match the pace of the technology changes in the industry all over the world Schwaller (Inti, 2009).

Automotive Mechanics Course (AMC) is one of the mechanical engineering trades offered at technical college level, the expectation of the society and the graduates is that of gaining employment in automotive industries, establishing a repair/ Maintenance shop or going for further studies after graduation. However, Jimoh (1997) observed that technical college graduates of AMC lack practical skills and are not carrying out maintenance work to the expectations and satisfaction of their employers. Okoye (Atsumbe, 2002) attributed the trend to the mismatch between skills demanded in the workplace and those provided by the schools. Technical Colleges in Bauchi and Gombe States have been graduating technicians in AMC over the years but little or no

effort has been made to appraise how these graduates are performing on the job. Daluba and Audu (2006) observed that Nigeria has been making several efforts to keep pace with other developed nations of the world through her emphasis on Science, Technology and Mathematics Education (STME). However, the present situation of unemployment in this country among technical college graduates is an indication that the self-reliant aspect of the national objectives has not been achieved.

It is a well-known fact that effective training in skill acquisition has immensely contributed to the technological excellence and economic self-reliance of the industrialized nations. It is for this reason that Ezeji and Okorie (1988) while stressing the importance of skill acquisition in nation growth, emphatically contended that Nigeria's social and economic problems will be drastically reduced if people are given adequate vocational training in skills, raw materials, machineries and equipment. Osuala, (1998) defined skill as the ability to perform expertly, facilitate performance during employment.

With the increase in sophistication of automobile and rapid growth in number of motor vehicles on Nigerian roads, the need for appraising the level of technical skills of technical college Automotive mechanic graduates in auto-electrical system maintenance cannot be over emphasized. This will unveil the areas of strength and weaknesses of products of technical colleges in order to enhance their competency on the job and to also make necessary improvement for future training of technicians, at the technical college level.

Research Question 1

What is the level of technical skills possessed by technical college automotive mechanics Graduates in auto-electrical system maintenance?

Research Question 2

What are the factors affects/Influence the level technical skills possessed by technical college automotive mechanics Graduates in auto-electrical system maintenance?

Hypothesis: 1

There is no significant difference between the Mean response of Automotive Mechanics Graduate Supervisors (AMGS) and the graduates on the Level of technical skills possessed graduates (AMG) in Auto-Electrical System Maintenance.

Hypothesis: 2

There is no significant difference between the Mean responses of AMGS and the graduates on factors affecting/Influencing the Technical skills possessed by the graduates in Auto-Electrical System Maintenance.

Methodology

The design of this study was a survey. Nworgu (1991) Describes survey research as one in which a group of people or items are studied by collecting and analyzing data from only few people or items that are considered to be representative of the entire group. The population for the study was all the Technical College Automotive Mechanics Graduates and Automotive Graduates workshop-based supervisors that are working in public and private sectors in Bauchi and Gombe States. A Sample of 56 Automotive Graduates and their 42 automotive graduates workshop-based Supervisors that are working in the public sectors of Bauchi and Gombe States were selected through Cluster sampling technique and served as respondents**.** The instrument for data collection for this study was structured questionnaire which was developed by the researcher after. The questionnaire items were formulated based on 5-point Likert-Type Scale. The responses categories are Very High (VH), High (H), Average (A), Low (L) and Very Low (VL). These responses categories were assigned numerical value of 5, 4, 3, 2, and 1 respectively.

The instrument was validated by three automobile technology education lecturers, three automotive teachers and three automotive workshops based supervisors. A pilot study was conducted using ten technical college Automotive mechanics graduates, three Automotive teachers and seven Automotive workshop-based supervisors that are working in Plateau State (outside the study are but the respondents are having similar characteristics with the main respondents) , a test-retest method was used, by administering the instrument to the same respondents twice, at an interval of two weeks and Pearson product moment correlation was used to determine the coefficient of reliability (r) of the instrument. The instrument had a reliability of 0.72.

Mean and Grand Mean statistics were used to answer the two research questions. The decision rule to accept or reject any item was based on mean of 3.50 and above, while Paired sample t-Test was used in testing the hypotheses at 0.05 level of significance. The calculated values of the t-Test were compared with the critical value obtained from the t-Test table. Hypotheses with t-calculated value that is equal or greater than t-critical value were rejected, while hypotheses with t-calculated value that are less than t-critical value were accepted.

Presentation of Results

Results of the data analyzed for the study were presented in tables 1 to 4

Research Question 1

What is the level of technical skills possessed by technical college motor vehicle mechanics Graduates in auto-electrical/electronic systems maintenance?

Table 1:
Grand Mean Responses of MVM Supervisors and Graduates on the level of technical skills possessed by the graduates in Auto-Electrical System Maintenance

S/no	Practical tasks Related to Auto-Electrical System Maintenance	n_1=42 $\bar{X}_1$	n_2=56 $\bar{X}_2$	n_T=98 $\bar{G}\bar{X}$	Remarks
1	Diagnosing of common battery faults and their symptoms	3.57	3.62	3.60	High
2	Conducting initial battery charge and recharge	3.50	3.52	3.51	High
3	Breaking down acid to obtain the correct electrolyte	3.62	3.57	3.60	High
4	Measuring specific gravity of electrolyte using hydrometer	3.6 0	3.64	3.62	High
5	Measuring voltage of cells on open circuit using battery testing equipment e.g. high rate discharge tester	3.02	3.07	3.05	Average
6	Measuring voltage of cells under load using battery testing equipment e.g. high rate discharge tester	2.74	2.86	2.80	Low
7	Determining the serviceability of components e.g. armature on the growler, starter motor	2.40	2.45	2.43	Low
8	Assembling starter motor components appropriately	2.36	2.48	2.42	Low
9	Bench test starter motor	2.40	2.38	2.39	Low
10	Faults tracing in light circuit	2.57	2.64	2.65	Low
11	Rectification of light circuit	2.43	2.67	2.55	Low
12	Faults tracing in traficator circuit	3.00	3.02	3.01	Average
13	Rectification in traficator circuit	3.02	2.86	2.94	Low
14	Faults tracing in windscreen wiper circuit	2.67	2.62	2.65	Low
15	Rectification in windscreen wiper circuit	2.36	2.57	2.47	Low
16	Faults tracing in heater circuit	2.55	2.62	2.59	Low
17	Rectification of heater circuit	2.38	2.31	2.35	Low
18	Faults tracing in petrol pump circuit	2.71	2.79	2.75	Low
19	Rectification of petrol pump circuit	2.57	2.62	2.60	Low
20	Faults tracing in warning light circuit	2.69	2.71	2.70	Low
21	Rectification of warning light circuit	2.36	2.45	2.45	Low
22	Faults tracing in door glass circuit	2.43	2.50	2.47	Low
23	Rectification of door glass circuit	2.36	2.43	2.40	Low
24	Testing of circuit for excessive resistance	2.40	2.24	232	Low
25	Diagnosing of common coil ignition system faults	2.95	2.79	2.32	Low
26	Faults tracing in transistorized ignition system	2.79	2.29	2.54	Low
27	Rectification of transistorized ignition system	2.14	2.29	2.22	Low
				2.72	**Low**

$\bar{X}_1$ =Mean ratings of Industrial Supervisors, X_2= Mean ratings of MVM Graduates, $\bar{G}\bar{X}$=Grand Mean ratings of MVM Graduate and Supervisors,
n_1=Number of Supervisors,
n_2=Number of MVM Graduates and
n_T=Total number of respondents.

Table 1 indicates that in Auto Electrical System Maintenance, Technical College MVM Graduates had High level of technical skills in 4 Practical tasks, items 1, 2, 3, and 4 with Grand Means ranging from 3. 51 to 3.62, Average level of technical skills in 2 Practical tasks, items 5 and 12 with Grand Means of 3.05 and 3.01 respectively and Low level of technical skills in 21 practical tasks, items 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26 and 27 with grand means ranging from 2.22- 2.94. This indicates that Technical College MVM Graduates are highly deficient in practical skills related to auto-electrical system maintenance.

Research Question 2

What are the factors affecting the technical skills possessed by technical college motor vehicle mechanics Graduates in auto-electrical system maintenance?

Table 2:
Factors affecting the level of technical skills possessed by Technical College Motor vehicle Mechanics Graduates in Auto-Electrical System Maintenance

S/no	ITEMS	n_1=42	n_2=56	n_1=98	
		$\bar{X}_1$	$\bar{X}_2$	$G\bar{X}$	Remarks
1	Mismatch between Technical College Automotive Mechanics trade curriculum content and workplace needs.	4.33	4.37	4.35	Agreed
2	Difference between learning environment (school workshop) and workplace environment	4.73	4.56	4.65	Agreed
3	Use of outdated and obsolete equipment in training	4.56	4.73	4.65	Agreed
4	Use of teachers that have no practical skills	3.53	4.50	3.52	Agreed
5	Absence or inadequacy of teaching and learning materials	4.62	4.75	4.69	Agreed
				4.37	**Agreed**

$\bar{X}_1$ =Mean ratings of Industrial Supervisors, X_2= Mean ratings of MVM Graduates, GX=Grand Mean ratings of MVM Graduate and Supervisors,
n_1=Number of Supervisors,
n_2=Number of MVM Graduates and
n_1=Total number of respondents.

Table 2 indicates that all the five items 1, 2,3,4 and 5, were accepted as factors affecting the job performance of technical college motor vehicle mechanic graduates with grand means ranging from 3.52 to 4.69.

Hypothesis 1:

There is no significant difference between the Mean response of AMGS and the graduates on the Level of technical skills possessed by technical College AMG in Auto-Electrical/Electronic Systems Maintenance.

Table 3:
Paired sample t-Test Analysis of the responses of Technical College AMGS and their Graduates on the level of technical skills in practical Tasks Related to Auto-Electrical System Maintenance

S/no	Practical tasks Related to Auto-Electrical System Maintenance	n_1=42	n_2=56				
		$\bar{X}_1$	$\bar{X}_2$	SD_1	SD_2	Cal. t	Remark
1	Diagnosing of common battery faults and their symptoms	3.57	3.62	0.86	0.99	0.70	NS
2	Conducting initial battery charge and recharge	3.50	3.52	0.94	0.71	0.33	NS
3	Breaking down acid to obtain the correct electrolyte	3.62	3.57	1.32	1.29	-1.43	NS
4	Measuring specific gravity of electrolyte using hydrometer	3.60	3.64	1.01	0.98	1.00	NS
5	Measuring voltage of cells on open circuit using battery testing equipment e.g. high rate discharge tester	3.02	3.07	1.05	1.11	1.43	NS
6	Measuring voltage of cells under load using battery testing equipment e.g. high rate discharge tester	2.74	2.86	1.19	0.93	1.40	NS
7	Determining the serviceability of components e.g. armature on the growler, starter motor	2.40	2.45	0.77	0.94	0.81	NS
8	Assembling starter motor components appropriately	2.36	2.48	0.91	0.92	2.35	S
9	Bench test starter motor	2.40	2.38	0.86	0.88	-1.00	NS
10	Faults tracing of light circuit	2.57	2.64	1.13	1.19	1.78	NS
11	Rectification of light circuit	2.43	2.67	0.99	1.12	3.58	S
12	Faults tracing of traficator circuit	3.00	3.02	1.08	1.12	0.27	NS
13	Rectification of traficator circuit	3.02	2.86	1.12	1.12	-2.47	S
14	Faults tracing in windscreen wiper circuit	2.67	2.62	0.72	0.94	-0.63	NS
15	Rectification of windscreen wiper circuit	2.36	2.57	1.06	0.91	3.34	S

16	Faults tracing in heater circuit	2.55	2.62	0.99	0.91	1.78	NS
17	Rectification of heater circuit	2.38	2.31	0.83	0.92	-0.90	NS
18	Faults tracing in petrol pump circuit	2.71	2.79	0.97	1.03	1.78	NS
19	Rectification of petrol pump circuit	2.57	2.62	1.06	1.04	1.00	NS
20	Faults tracing in warning light circuit	2.69	2.71	1.14	1.31	-0.30	NS
21	Rectification of warning light circuit	2.36	2.45	1.19	1.23	2.08	S
22	Faults tracing in door glass circuit	2.43	2.50	1.06	1.07	1.36	NS
23	Rectification of door glass circuit	2.36	2.43	1.12	1.13	1.78	NS
24	Testing of circuit for excessive resistance	2.40	2.24	0.94	1.21	1.86	NS
25	Diagnosing of common coil ignition system faults	2.95	2.79	0.80	0.32	1.31	NS
26	Faults tracing of transistorized ignition system	2.79	2.29	1.39	1.13	4.37	S
27	Rectification of transistorized ignition system	2.14	2.29	1.37	1.40	2.61	S

$\bar{X}_1$=Mean ratings of Industrial Supervisors, $\bar{X}_2$= Mean ratings of AMG,
n_1=Number of Supervisors,
n_2=Number of AMG,
SD_1=Standard Deviation of Supervisors,
SD_2= Standard Deviation of the Graduates,
Df = 96, t-cri = 1.984, NS= Not Significant and S= Significant

Table 3 indicates that items 1, 2, 3, 4, 5, 6, 7, 9, 10, 12, 14, 16, 17, 18, 19, 20 , 22, 23, 24, and 25 had their calculated t-value less than the table t-value of 1.984 at 0.05 level of significance. Therefore there was no significant difference between the Mean responses of Supervisors and graduates on the Level of the job performance of the AMG on these items. However items 8, 11, 13, 15, 21, 26, and 27, had their calculate t-value greater than the table t-value. These indicate that there was a significant difference between the mean responses of the Supervisors and graduates on the LEVEL OF TECHNICAL SKILL of AMG in all the items except items 8, 11, 13, 15, 21, 26, and 27.

Hypothesis: 2

There is no significant difference between the Mean response of AMGS and the graduates on factors affecting job performance of Technical College AMg in Auto-Electrical System Maintenance.

Table 4:
Paired sample t-Test Analysis of the responses of Technical College AMGS and the Graduates on Factors Affecting Job Performance of Technical College AMG in practical Tasks Related to Auto-Electrical System Maintenance

S/no	ITEMS	n_1=42	n_2=56				
		$\bar{X}_1$	$\bar{X}_2$	SD_1	SD_2	Cal. t	Remark
1	Mismatch between Technical College AMC curriculum content and workplace needs	4.33	4.37	0.47	0.72	-0.21	NS
2	Difference between learning environment (school workshops) and workplace environment	4.73	4.56	0.44	0.51	1.22	NS
3	Use of outdated and obsolete equipment in training	4.56	4.73	0.51	0.44	1.22	NS
4	Use of teachers that have no practical skills	3.53	4.50	1.24	0.63	-4.31	S
5	Absence or inadequacy of teaching and learning materials	4.62	4.75	0.49	0.45	-1.01	NS

$\bar{X}_1$=Mean ratings of Industrial Supervisors, $\bar{X}_2$= Mean ratings of AMG,
n_1=Number of Supervisors,
n_2=Number of AMG,
SD_1=Standard Deviation of Supervisors,
SD_2= Standard Deviation of the Graduates,
Df = 96, t-cri = 1.984, NS= Not Significant and S= Significant

Table 4 indicates that items 1, 2, 3 and5 had their calculated t-value less than the t- table value of 1.984 these therefore indicates that there was no significant difference between the Mean responses of Supervisors and graduates in 4 out of the five factors affecting job performance of MVM graduates. However item 4 has calculate t-value greater than the t- table value therefore there is a significant difference in the mean response of supervisors and graduates on this item i.e use of teachers that have little or no practical skills in training of motor vehicle students.

Findings of the Study

1. Technical College Motor Vehicle Graduates exhibited low level of technical skills in auto-electrical system maintenance; hence they are deficient in practical skills.
2. The study identified the following as factors affecting the level of technical skills in auto-electrical system maintenance of the graduates: --
   (i) Mismatch between technical college Motor Vehicle curriculum and the needs of the workplace.
   (ii) Difference between learning environment and workplace, use of outdated and obsolete in training.
   (iii) Use of teachers that have no practical skills and
   (iv) Inadequacy of teaching and learning materials.

Discussion of Findings

The findings of this study revealed that technical college graduates were deficient in most skills on Auto-electrical system maintenance. This is in agreement with Jimoh (1997) who, observed that technical college graduates of Motor Vehicle Mechanic (MVM) lack practical skills and are not carrying out maintenance work to the expectations and satisfaction of their employers. The second finding of the study attributed the deficiency in the auto-electrical skills to mismatch between curriculum content and workplace needs. This in agreement with Okoye (Atsumbe, 2002) attributed the trend of unemployment and under employment to the mismatch between skills demand in the workplace and those provided by the schools. The finding is also in agreement with one of the principles vocational and technical education that the only reliable source of content for specific training in an occupation is the experience of the masters of that occupation Dewy (Inti, 2004). The third finding attributed the deficiency of skills in auto-electrical system by graduate to the difference between learning environment and working environment, this finding is in agreement with one of the principles of vocational and technical education that vocational/ technical education will be efficient in proportion as the environment in which the learner is trained is a replica of the environment in which he may subsequently work Dewy (Inti, 2004). The fourth finding revealed that use of outdated and obsolete equipment in training affects the level of technical skills possessed by the graduates in auto-electrical system maintenance. This is also in agreement with one of the principles of vocational education that effective vocational and technical training can only be given where the training jobs are carried out in the same way, with the same operations, the same tools, the same machines and equipment as in the occupation itself Dewy (Inti, 2004). The fifth finding further attributed the deficiency in auto-electrical skills by graduates to the use of teachers that have no practical skills in training, this is also in agreement with one of the principles of vocational and technical education, that vocational and technical training will be effective in proportion as the instructor has had successful experience in the application of skills and knowledge to the operation and processes he undertakes to teach Dewy (Inti, 2004).

Conclusions

The inability of the technical and vocational college automobile mechanics graduate to put knowledge obtained from the school into practical use in actual job situation is as a result of lack of necessary skills required for actual work, this poses a challenge both to the government and teachers involved in training. Steps should be taken to reverse this ugly situation in order to prepare technical college students adequately for employment in the automobile industries.

Recommendations

Based on the findings of this study the following recommendations are made:

1. Prototypes of modern motor vehicle and up to date equipment, tools and facilities should be made available for the teaching of students in technical colleges.
2. Motor vehicle mechanic teachers should be allowed to go for refresher courses/workshop in the automobile industry to update their practical skills.
3. Curriculum of Technical colleges should be reviewed on a regular basis to reflect workplace needs
4. The learning environment should be a replica of working environment

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