

Improving Auto-Electricity Skills in Graduates of Technical and Vocational Colleges for Employment in the Automobile Industries: Implication for Sustainable Technological Development in Nigeria.

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Abstract

This study was aimed at identifying auto-electricity skills that could improve students, skill especially those whose skills are deficient. A survey research design was used for the study. The respondents the study consisted of 16 technical and vocational college teachers and 60 automobile industrial workers. A structured questionnaire developed by the researcher was used as the instrument for data collection. The questionnaire was subjected to face validation by five experts and thereafter was pilot-tested on 6 respondents who were not part of the population used for the study. The reliability coefficient of the instrument was calculated to be 0.88 using the Crombach Alpha Formula. One research question and a hypothesis guided the study. Mean and Standard Deviation were used to answer the research question while t-test was employed to test the hypothesis. The study revealed among others that technical and vocational college students are deficient in skills required to carryout repairs and diagnosis on automobile suspension, steering and transmission system skills. Consequently, the study recommended that technical and vocational college students should be provided with skills in those areas where they lack skills in order to make them employable in the automobile industry.

Introduction

Technical Education is that aspect of Education, which lead to the acquisition of practical and applied skills as well as basic scientific knowledge (NPE, 2004). Technical Colleges are further identified as one of the five types of Technical Education Institution outside the Universities. Motor Vehicle Technology is one of the courses taught in Technical Colleges in Nigeria. As stated by the National Board for Technical Education, (NBTE) students are expected to pass through an approved programme supervised by the board. By implication, the students are expected to acquire certain skills that will make them functional in the society.

Specifically, students in the technical and vocational colleges are expected to acquire the skills needed for employment in the automobile industry or for self-employment after graduation. Daluba and Audu (2006) observed that Nigeria has been making series of desperate 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 and vocational college graduates is an indication that the national objective of the self-reliance has not been achieved.

It is a well known fact that effective training in skill acquisition has 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.

Advances in technology has rendered electrical skills in motor mechanics inadequate for work in automobiles industry, while creating needs for new and often sophisticated skills. This is because automobile products are coming with new devices as a result of technological advancements.

With the seemingly rapid growth in motor vehicle population on Nigerian roads, there is the need to improve skills of the workforce needed for auto-electricity work in the motor industry. This study therefore, identifies electricity skill areas where students are deficient and need improvement. This is with a view to sustaining the pace of development in auto-electricity work in the motor industry in Nigeria for sustainable technological development.

Research Question

What are the auto-electricity industrial-based skills in which technical and vocational college students are deficient?

Hypothesis:

There is no significant difference between the mean opinion of automobile industry workers and technical teachers on the skills in which students are deficient in the area of auto-electricity.

Methodology

The population of this study consisted of motor mechanical teachers teaching in NBTE accredited technical vocational colleges in Niger States that are offering auto-mechanics trades and automobile industrial workers who are graduates of technical and vocational colleges working in maintenance section of the industry. A total of 76 respondents were used, these

includes 16 teachers and 60 automobile industrial workers. 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 Highly Available (HA), Quite Available (QA), Available (A), Slightly Available (SA) and Unavailable (UA). These responses categories were assigned numerical value of 5, 4, 3, 2, and 1 respectively.

The questionnaire was subjected to face validation by five experts from the Department of Industrial and Technology Education, Federal University of Technology, Minna, Niger State. From the trial testing, the reliability coefficient of the instrument was calculated to be 0.88 using Crombach Alfa formula.

The data generated for this study were analyzed using mean and standard deviation to answer the research question. Decisions were taken based on the mean. However, the hypothesis was tested using t-test statistics at 0.05 level of significance. The response scale was 3.00. The lower limit of the mean was 2.50 while the upper-limit of the mean was 3.50 with an interval of .05 from the mean. Therefore, any item with mean of 3.50 and above was considered deficient while any item with the mean of less than 3.0 was considered not deficient.

Presentation of Results

Results of the data analyzed for the study were presented according to the research question and hypothesis. The results are presented in tables 1 and 2.

Research Question

What are the auto-electricity industrial-based skills in which technical and vocational college students are deficient?

Table 1

Responses on Auto-Electricity Industrial-Based Skills that Technical and Vocational College Students are Deficient.

Items	The following are skills on auto-electrical system where students are deficient	Industry workers Mean (M ₁)	Technical teachers Mean (M ₂)	Grand Mean (M ₃)	SD	Decision
1.	Check continuity in electrical circuit test light and voltmeter, oscilloscope and wiring diagram.	4.33	4.37	4.34	0.53	Deficient
2.	Check for shorts, opens and ground wiring.	5.43	4.81	4.59	0.49	Deficient
3.	Measure resistance in electrical circuits using an ohmmeter	4.62	4.75	4.64	0.48	Deficient
4.	Measure volts with a voltmeter or oscilloscope	4.75	4.56	4.71	0.51	Deficient
5.	Clean and inspect battery clamps, cables and connectors	3.17	1.62	2.84	1.61	Not deficient
6.	Perform battery condition tests	4.35	3.87	4.25	0.65	Deficient
7.	Jump start a vehicle	4.07	4.31	4.11	0.78	Deficient
8.	Charge and install a battery	4.50	4.81	4.56	0.75	Deficient
9.	Diagnose starting system and determine needed repair	4.00	3.87	3.97	0.76	Deficient
10.	Remove, clean and inspect starter motor and	4.33	4.25	4.31	0.66	Deficient

	component					
11.	Diagnose charging system and determine needed repair	4.18	4.62	4.27	0.68	Deficient
12.	Remove, clean and inspect alternator	4.52	4.93	4.60	0.59	Deficient
13.	Diagnose lighting system problems and determine needed repair	4.22	4.06	4.18	0.86	Deficient
14.	Repair or replace light sockets wires and switches	3.53	4.50	3.74	1.20	Deficient
15.	Diagnose and repair electrical accessories horn, wipers and motors	4.10	3.57	4.05	0.79	Deficient
16.	Diagnose and determine needed repair on active view mirror	4.73	4.56	4.67	0.46	Deficient
17.	Diagnose and determine needed repair on rear viewed mirror	4.85	4.31	4.74	0.47	Deficient
18.	Diagnose and determine needed repair on adaptive head light	4.78	4.93	4.81	0.39	Deficient
19.	Diagnose and determine needed repair on automatic rain sensitive front windscreen wiper.	4.23	4.81	4.38	0.81	Deficient

Key: N=76, SD = standard deviation, $M_{1,2,3}$ = mean

The data in Table 1 reveals that the mean opinion of both industrial and technical workers to items 25, 26, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18 and 19 are greater than the cut-off point of 3.50. These shows that majority of the respondents used for this study agreed with these items as the skills on motor mechanics electrical system where students are deficient.

However, item 5 had a mean for the industrial workers and technical teachers that are lower than 3.50, hence, the majority of the respondents disagreed with this item. This means that students in technical and vocational colleges are not deficient in skills of cleaning and inspecting battery clamps, cables and connectors. The standard deviation ranged between 0.39 and 1.20. This shows that the respondents were close to one another in their responses.

Hypothesis

There is no significant difference between the mean opinion of automobile industry workers and technical teachers on the skills in which students are deficient in the area of auto-electricity.

Table 2

t-test Analysis of the Mean Opinion of Automobile Industry Workers and Technical Teachers on the Skills in which Students are Deficient in the area of Auto-Electricity.

Items	Industry workers		Technical Teachers		t-calculated	Table Value	Remark
	Mean(M ₁)	SD	Mean(M ₂)	SD			
1.	4.33	0.47	4.37	0.72	-0.21		NS
2.	5.43	0.50	4.81	2.40	-2.35		S
3.	4.62	0.49	4.75	0.45	-1.01	2.00	NS
4.	4.75	0.43	4.56	0.73	0.99		NS
5.	3.17	1.63	1.62	0.62	5.93		S
6.	4.35	0.48	3.87	1.02	1.82		NS
7.	4.07	0.82	4.31	0.60	-1.31		NS
8.	4.50	0.79	4.81	0.54	-1.83		NS
9.	4.00	0.80	3.87	0.62	0.69	2.00	NS
10.	4.33	0.63	4.25	0.77	0.38		NS
11.	4.18	0.70	4.62	0.50	-2.85		S
12.	4.52	0.62	4.93	0.25	-4.04		S
13.	4.22	0.88	4.06	0.79	0.71		NS
14.	3.53	1.24	4.50	0.63	-4.31		S
15.	4.10	0.77	3.57	0.88	0.95		NS
16.	4.73	0.44	4.56	0.51	1.22		NS
17.	4.85	0.36	4.31	0.60	3.44		S
18.	4.78	0.41	4.93	0.25	-1.83		NS
19.	4.23	0.86	4.81	0.40	-3.88		S

df = 74, S = Significant, NS=Not Significant, P=0.05

Items 1 to 19 are the same as in table 1. Table 2 shows that item 1,3,4,6,7,8,9,10,13,15, 16 and 18 had their calculated t-value less than the table t-value of 2.00 at 0.05 level of significance. This indicates that there was no significant difference between the mean responses of automobile industry workers and technical teachers for these items. However, items 2, 5, 11, 12, 14, 17 and 19 had their calculated t-value above the table t-value. These indicate that there was significant difference between the mean responses of the automobile industry workers and technical teachers for these items. With this result, the null-hypothesis for no significant difference was upheld for all the items except items 2, 5, 11, 12, 14, 17 and 19.

Discussion

The findings of this study reveal that technical and vocational college students are deficient in most skills on electrical system repair of automobile. Advances in technology have rendered a lot of traditional skills inadequate for the world of work. The situation revealed in this study agrees with Nice (2001) and Schwaller (1993) who said that as motor vehicle engines and other systems become more electronically controlled. Electronic tools must also be improved. Both on board and off board advance diagnostic tools have been developed in response, such as electronic engine analyzer, air bag stimulator and automatic braking systems (ABS) scanning tools. Technical and vocational college students have to be trained to meet up with this 21st century challenge, else, we will continue to depend on foreign expatriate for even maintenance of our motor vehicles, a situation that would work against sustenance of the current pace of development in auto-electricity works in motor industry in Nigeria for sustainable technological development.

Implications of the findings

From the foregoing, the following implications can be drawn:

- i. Technical and vocational students must be conditioned to go through the rigor of the change in technology in order to catch up with contemporary technology. To do this successfully, a new assessment procedure needed to be drawn putting into consideration the need of the automobile industry.
- ii. There is no doubt that technical and vocational colleges encourage practical skills. In contemporary learning, technical and vocational college students should be treated to making science learning more meaningful as it pertains latest automobile technology. This again will keep them abreast with latest developments theoretically and which is the basis of the practical skills.

Recommendations

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

- i. Modern motor vehicle should be made available to teach students in technical and vocational colleges. The number of new systems is increasing daily in automobiles. This has continued to make the vehicle more complex particularly with respect to maintenance. As a measure of reducing this complexity, modern vehicle with similar mechanism if made available to students for practical work may serve as a relevant experience for work after graduation.
- ii. Auto mechanic teachers should be allowed to go for refresher courses/workshop in the automobile industry. These should involve the processes of vehicle development and use from design through manufacturing and maintenance. For the automobile technology teacher to instruct on modern vehicle he must understand not only the parts and operation of the vehicle but must also understand the diagnosis and service

procedures for each new system in the vehicle. Workshop in this respect will promote quality of both teacher and products of technical and vocational colleges.

Conclusions

On the basis of the findings it can be concluded that motor mechanic students in technical colleges are deficient in auto-electrical skills required for employment in the automobile industry. The influence of technology has revealed traditional skills inadequate for the world of work. 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 government and teachers involved in training. Steps should be taken to reverse this ugly situation in order to prepare technical and vocational college students adequately for employment in the automobile industry.

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