The Level of Availability of Recommended Tools and Equipment for Teaching Motor Vehicle Mechanic Works for Sustainable Industrial Development in Nigeria

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Abstract

The study focused on assessment of the level of availability and utilization of facilities for effective teaching and learning of motor vehicle mechanic works for sustainable industrial development in Nigeria. Three research questions guided the study. Two null hypotheses was formulated and tested at 0.05 level of significance. Survey research design method was adopted for the study. A total of 92 responded made up of 78 motor vehicle mechanics works students and 14 motor vehicle mechanic works teachers in technical college in North central states of Nigeria were randomly sampled. The instrument used for data collection was a structured questionnaire titled motor mechanic assessment questionnaire (MMAQ). The instrument was validated by three experts. Split half technique and Cronbach alpha reliability method were used to determine the internal consistency of the instrument. A reliability coefficient of 0.79 was obtained. Ninety two copies of questionnaire were administered to the respondents with the help of three research assistants. All the 92 copies of questionnaire were retrieved and analyzed using gap analysis, mean and standard deviation to answer the research questions. t-test statistics was employed to test the null hypothesis at 0.05 level of significance. It was found out that NBTE recommended tools and facilities for teaching and learning of motor vehicle mechanic works workshop in the technical colleges were not available. It was also discovered that available tools and equipment in the technical colleges were used for teaching and learning of motor vehicle mechanic work. It was recommended that more tools and equipment of motor vehicle mechanic works should be provided for technical colleges' for sustainable industrial development in Nigeria.

Introduction

Some of the basic factors that could help in achieving meaningful technical education in motor vehicle mechanic include the provision of physical structure, tools and equipment. According to Olaitan, Igbo, Nwachukwu, Onyemachi and Ekong (1999) the effective implementation of any technical education curriculum depends on the quality of the teachers and their ability to effectively manipulate, operate and tools and equipment that are available for the training of the students. This implementation strategy indicates that without adequate material resources (facilities) and human resources, the objectives of technical cannot be achieved. Okoro (1999) pointed out that the objective of technical education could only be justifiable, if the products, as individuals can perfectly carry out operations by themselves. He further stated that

such operations automatically call for skill acquisition of instructional facilities. Such facilities include workshops, tools, equipment machines and teachers who can utilize them for instruction.

Technical education is that type of education which deals with practical skill acquisition and application of basic scientific knowledge (Federal Government of Nigeria, 2001). One of the aims of technical education as stated in the National Policy on Education (2004) 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. It is obvious then that manipulative skills are only means to justify that meaningful learning has taken place in technical education. Motor vehicle mechanic works craft is an aspect of technical education offered as a course at technical colleges. It is a skill oriented course. Skill can only be achieve in motor vehicle mechanic works craft when judicious use is made of instructional facilities provided for the training of the students by the teachers. The stated objective will be difficult to achieve without adequate provision of tools and equipment for practical training of the students.

For proper skill acquisition in motor vehicle works craft practice, qualified and committed teachers as well as adequate and functional tools and equipment are required (Okorie, 2001). Therefore, the availability and judicious utilization of educational facilities like workshop, classroom, machine, equipment and consumable material deserve serious attention for effective teaching and learning of automobile craft practice. Uzoagulu (1998) explained that to give training and impart the desired technical skills to students, require an effective utilization of tools and equipment. One of the principles of technical education, as stated in Okorie (2001) is that repetitive training enhances the development of right attitude and habit of thinking and doing to the degree necessary for employment. There has been a continual evolution in the design of automobiles with the aim to achieve faster, more reliable, more stream lined, cleaner and safer vehicle. Innovations have led to the introduction of electronic devices and controls in many systems of the motor vehicles. In the maintenance department, a mechanic specialist will be called upon to service, dismantle, check, repair, reassemble and check engines and units such as transmission and differentials. This job requires a great deal of knowledge and experience and above all the availability of relevant training facilities. The National Board for Technical Education (2009) published a list of approved equipment for the training of motor vehicle mechanic works trade in Technical Colleges. The facilities were categorize as hand tools, drilling

and screw cutting machine tools, measuring tools, Lub bay tyre/wheel service, joining metal, general servicing and other utilities.

Charles Prosser's theorems on principles of vocational education as cited in Okoro (1999) indicated that effective vocational training can only be given when the training job are done in the same way with the same operation, using the same tools and equipment as well be found in the occupation itself. This denotes that it will be deceitful to train students using hand tools, while the actual job required the use of machine tools. Training using obsolete tools will certainly produce graduates who will not be relevant on the job unless given a new training to meet the desire of their employers. Today's mechanic must be familiar with and understand the use of a large number of tools and instruments, digital instrument (for detecting faults). Proper tool selections will improve both the quality and speed of any repair operation. Many repair jobs would be exceedingly difficulty without the right tool for the job. The modern automobile as a result of developments and the emergence of new technologies is becoming a composite of many sophisticated technologies with many complex components and systems. Facilities for the training of mechanic to handle the maintenance of these new modern automobiles are however not reflected in the learning content of the curriculum for motor vehicle mechanic work programmes in the technical colleges. This has left a gap between the trade theory and practice component of curriculum and the current state of automobile technology.

According to the report of Federal Ministry of Education (1990) the present curriculum in use was developed in 1985. This is about two decades behind the state of the art in automobile technology. Moreover, the National Business and Technical Examination Board (NABTEB) 2001 and 2002 examination results showed poor performance of students in motor vehicle mechanic works. These poor (2001) be due to inadequacy of facilities for teaching and learning of motor vehicle mechanic work. Most of the products of technical colleges are also said to lack the knowledge and skills needed to diagnose faults and effect repairs in most automobile system (Okoro 1999, NABTEB 2000). With all the above assertion, it becomes necessary to assessment the level of availability and utilization of facilities for effective teaching and learning of motor vehicle mechanic works in technical colleges for sustainable industrial development in Nigeria. Specifically, the study sought to:

(1) Assess level of availability of facilities for the teaching and learning of motor vehicle mechanics works in technical colleges for sustainable industrial development in Nigeria?

(2) Assess rate of use of available tools equipment and machine for the teaching and learning of motor vehicle mechanic works craft practice in technical colleges for sustainable industrial development in Nigeria?

(3) Identify possible ways of minimizing the problems encountered by teachers and students in technical colleges in utilizing facilities for effective teaching and learning of motor vehicle mechanic works for sustainable industrial development in Nigeria?

Research Questions

The following three research question guided the study.

1. What is the level of availability of facilities for the teaching and learning of motor vehicle mechanic works in technical colleges for sustainable industrial development in Nigeria?
2. What is the rate of the use of available tools, equipment and machines for teaching and learning of motor vehicle mechanic works craft practice in technical colleges for sustainable industrial development in Nigeria?
3. What are the possible ways of minimizing the problems encountered by teachers and students in technical colleges in utilizing facilities for effective teaching and learning of motor vehicle mechanic works for sustainable industrial development in Nigeria?

Methodology

Three research questions guided the study. Two null hypothesizes were formulated and tested at 0.05 level of significance. Survey research design was adopted for the study. Survey research design according to Olaitan, (2000) is a plan, structure, strategy that the investigator wants to adopt in order to obtain solution to research problems using questionnaire the data. The Questionnaire title motor mechanics Facilities assessment questionnaire (MMFAQ) was used to collect data for the study. The study was carried out in technical colleges in north central states of Nigeria. A total of ninety two respondents made up of 78 motor vehicle mechanics work students and 14 motor mechanics work teachers were selected through stratified random sampling technique from a population of 170 students and 46 teachers of motor vehicle mechanics work in technical colleges in north central states, Nigeria. A structured questionnaire titled motor mechanics facility assessment questionnaire (MMFAQ) was used as Instrument for data collection. The MMFAQ was divided into four sections; section A is concerned with bio-

data of the respondents, section B seeks information on the availability of workshop tools, and equipment required for the training of modern motor vehicle mechanic works. Thus a list of equipment used in standard automobile servicing stations and as identified by NBTE (2009) were listed. Gap analysis was used to subtract NBTE recommended list from available list of tools and equipment section C of the questionnaire required that respondents respond to a set of 10 statements that were drawn to equipment in their workshop. The section was responded to by both teachers and motor vehicle mechanic year II students. They are expected to respond to a five point likert scale of always (A), occasionally (O), undecided (UD), rarely (Ra) and never used (Nu). Section D of the questionnaire presented a list of minimizing the problems encountered by teachers and students in the technical colleges in assessing and utilizing facilities for effective teaching and learning of motor vehicle mechanic works in north central states of Nigeria both the teachers and students were responded to this section accordingly.

The instrument was validated by three experts from Department of Industrial and Technology Education, School of Science and science Education, Federal University of Technology, Minna. Split half technique and cronbach alpha reliability method were used to determine the internal consistency of the instrument. A reliability coefficient of 0.79 was obtained. Ninety-two (92) copies of questionnaire were administrated on the respondents with the help of four research assistants. All the 92 copies of the questionnaire were retrieved and analyze using mean and standard deviation to answer the research questions I and 3 while t-test statistic was used to the null hypothesis at 0.05 level of significance. For the gap analysis, subtract recommended list from available list, if the value is negative, then it means the available list of tools and equipment is more than the recommended list by NBTE which indicates HR, but if the value is positive, it means that available is less than the recommended which of cause indicate LR.

Result

The result of data analyzed in this study is presented below.

Research Question 1

What is the level of availability of facilities for the teaching and learning of motor vehicle mechanic works in technical colleges for sustainable industrial development in Nigeria?

Table 1: Level of Availability of Recommended Tools and Equipment for Teaching Motor Vehicle Mechanics Work

S/N	Item statements	NTBE Recommended Tools & Equipment	Number of Tools & Equipment Available per school	Gap Analysis	Remarks
1	Tools boxes with various numbers of recommended sets of hand tools	100	30	70	LR
2	Drilling and screw cutting equipment	50	20	30	
3	Measuring tools	50	21	29	
4	Machine tools	50	15	35	
5	Metal joining tools/equipment	30	10	20	
6	Lube Bay tyre/wheel service facilities and equipment	5	1	4	
7	General servicing and reconditioning equipment	20	7	13	
8	Miscellaneous facilities	30	12	18	

*R = Meet recommended standard
LR = Lower than recommended
HR = higher than recommended

Table 1 above showed that gaps between NTBE recommended tools and equipment for a technical college and number of tools and equipment available in a technical college in the study area are positive. This indicate that tools and equipment for teaching and learning motor vehicle mechanics work in technical colleges needs more tools and equipment to satisfy NTBE recommendation.

Research Question 2

What is the rate of use of available tools, equipment and machines for teaching and learning of motor vehicle mechanic works craft practice in technical colleges for sustainable industrial development in Nigeria?

Hypothesis

There is no significant distance difference in the mean responses of motor vehicle mechanic works teachers and students on the rate of use of available tools, equipment and machines for

teaching and learning of motor vehicle mechanic works craft practice in technical colleges for sustainable industrial development in Nigeria.

Table 2: Mean rating and t-test Analysis of the Responses of Teachers and Students on the Rate of Use of Available Tools, Machines and Equipment.

S/N	Item Statement	X	SD	t-cal	t-tab	Remarks	
1	Tool boxes with various numbers of recommended sets of hand tools	3.55	0.67	0.45	1.86	A	NS
2	Drilling and screw cutting equipment	3.51	0.56	0.67	"	A	NS
3	Measuring tools	3.78	0.45	0.63	"	NA	NS
4	Machine tools	2.67	0.98	2.00		NA	NS
5	Metal joining tools/equipment	3.61	073	0.99	"	A	NS
6	Lube Bay tyre/wheel service facilities and equipment	2.49	0.99	1.98	"	NA	NS
7	General servicing and reconditioning equipment	3.71	0.72	1.56	"	A	NS
8	Miscellaneous facilities	3.65	0.61	0.61	"	A	NS

T- table value= 1.86

Table 2 showed that 6 out of 8 items in the table had mean range of 3.55 to 3.78. This range was above a minimum required mean of 3.50. The items 4 and 6 had the mean value of 2.67 and 2.49 which below cutoff point of 3.50. The items in the table also had standard deviations range of 0.45 to 0.99, which was an indication that the respondents were closed together among themselves and not far away from the mean in their opinions. Therefore, the hypotheses of no significant difference in the mean ratings of the two groups of respondents on 8 items on rate of the use of available tools, equipment and machines for the teaching and learning of motor vehicle mechanic works craft practice in technical colleges in north central states of Nigeria were held.

Research Question 3

What are the possible ways of minimizing the problems encountered by teachers and students in technical colleges for teaching and learning of motor vehicle mechanic works for sustainable industrial development in Nigeria?

Hypotheses

There is no significant difference in the mean responses of principal and motor vehicle mechanics work teachers on possible ways of minimizing the problems encountered by teachers and students in utilizing facilities for teaching and learning of motor vehicle mechanics works for sustainable industrial development in Nigeria.

Table 3

Mean ratings and t-test of the responses of technical college principals and motor vehicle mechanic works teachers in technical colleges on possible ways of minimizing the problems encountered by teachers and students in utilizing facilities for teaching and learning of motor vehicle mechanics works for sustainable industrial development in Nigeria.

S/N	Item statement	x	SD	t-cal	t-tab	Remarks	
						RQ	Ho
1	The board for technical education should go on a regular routine inspection to ascertain the extent to which these workshops are equipped and update them where necessary	4.16	1.12	0.82	1.86	Agree	NS
2	A special grant should be provided to purchase workshop tools and equipment by the government	3.91	0.82	0.61	"	Agree	NS
3	Fund meant for the purchased of tools workshop tools and equipment must be used wholly for that.	3.58	0.78	0.54		Agree	NS
4	The authorities concern should cultivate a good maintenance culture	3.70	0.73	0.61		Agree	NS
5	The security around the workshops be reinforce in order to ward off thieves.	3.70	0.73	0.34		Agree	NS
6	The subject specialists to take part in the purchase of the tools and equipment to ensure accuracy and sufficiency	3.73	0.94	0.52		Agree	NS
7	Parents through Parent Teachers Association should from time to time supplement the effort of the government in the provision of tools and equipment	3.66	0.82	0.80		Agree	NS

8	Industrial should supply the necessary tools and equipment to the technical colleges, since they are the major consumer of their products	3.79	0.56	0.72	Agree	NS
9	Availability of spare parts must ensure before purchase is made order to ensure easy maintenance	3.78	0.76	0.61	Agree	NS
10	Student admission should be made with particular regard to quality of tools and equipment available and the capacity of the workshop.	3.68	0.76	0.74	Agree	NS
11	Workshop rules and regulations especially as it boarders on machine and human safety must be emphasized.	3.68	0.90	0.73	Agree	NS

T-table value=1.86

Table 3 showed that the 11 possible ways of minimizing the problems encountered by teachers and students in utilizing facilities of teaching and learning had their mean values ranged from 3.58 to 4.16, which were above the cutoff point of 3.00. This showed that all the 11 item statements are possible ways for minimizing the problems encountered by teachers and students in utilizing facilities for teaching and learning. Table 3 also showed that all the item statement on possible ways to minimize problems encountered by teachers and students in utilizing facilities for teaching and learning had their t- cal values less than t- table of 1.86. this indicate that there was no significant difference in the mean ratings of the responses of principals and teachers of motor vehicle mechanics work on possible ways for minimizing the problems encountered by teachers and students in utilizing facilities for teaching and learning in technical colleges in north central states, Nigeria. Therefore, the hypotheses of no significant differences in the mean ratings of the two groups of respondents on 11 items on possible ways of minimizing the problems encountered by teachers and students in utilizing facilities for teaching and learning were held.

Discussion of Result

It was found out that tools and equipment were not enough for teaching and learning of motor vehicle mechanics work in technical colleges in north central states, Nigeria. That is more tools and equipment are still needed for training in the colleges in the study area. This finding agreed with the submission of Olaitan (2006) who stated that skills can only be achieved in

motor vehicle mechanic works practice when all requisite and tools, equipment and facilities are available for the teaching and learning process. The finding was also in line with the opinion of Fajemirokun (2000) said that facilities are not completely absent, but that the enrolment of students has outnumbered the capacity of facilities available in most of the institutions. The author found out that tool, machines and equipment should be provided in the schools so as to commensurate with school enrolment. The discovery of inadequate tools and equipment in technical colleges as revealed by this study corroborated Essiens (2006) when he stated that the non practical oriented teaching of technical subjects could have been caused by inadequate basic facilities such as tools equipment and consumable resources.

The finding on the hypothesis revealed that there was no significant difference in the mean ratings of the responses of teachers and students of motor vehicle mechanics work on the rate of the use of available tools, equipment and machines for the teaching and learning of motor vehicle mechanic works craft practice in technical colleges. These indicate that available tools and equipment were used for teaching and learning motor vehicle mechanic work. Also, there was no significant difference in the mean ratings of the responses of teachers and student of motor vehicle mechanics work on the possible ways of minimizing the problems encountered by teachers and students in utilizing facilities for teaching and learning motor vehicle mechanics work in technical colleges. This indicate that both group of respondents were in support of the ways of minimizing the problems encountered by teachers and students in utilizing facilities for teaching and learning motor vehicle mechanics work in technical colleges in north central states, Nigeria.

Conclusion

As a result of the study, it was hereby concluded that the absence of modern workshop tools and equipment needed for the training of motor vehicle mechanic works students is a contributing factor to the dismay performance of the students in external examinations. It is also a great contributing factor to the poor practical skills exhibited by motor vehicle mechanic works technical colleges graduates. It is therefore recommended that:

(1) Government should equip the technical colleges with modern equipment and facilities for the training of the motor vehicle mechanic as recommended by the NBTE (2009) if they are to remain relevant in the auto industries;

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(1) Government should equip the technical colleges with modern equipment and facilities for the training of the motor vehicle mechanic as recommended by the NBTE (2009) if they are to remain relevant in the auto industries;

(2) Obsolete and faulty equipment should be replaced, repaired or installed as the case warrant;

(3) Grant should be given to the colleges by owner states in other for the colleges to be able to purchase consumable for workshop practice;

(4) The teachers in the colleges should be motivated in order for them to continue to put in their best as regard the usage of available facilities at their disposal

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