Retraining Needs of Auto-Mechanics for Effective Maintenance of Automobiles in Niger State

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Abstract

This study was designed to determine the areas in which Auto-mechanics need retraining for effective maintenance of automobiles in Niger State. To carry out this study, two research questions and two hypotheses were formulated to guide the investigation using a structured questionnaire developed by the researcher. Three experts content and face validated the instrument. The reliability coefficient of the instrument is 0.81 which was determined using Cronbach Alpha. The questionnaires were administered to 60 experienced and 60 less experienced Auto-mechanics in Niger state. The data generated were analyzed using Mean, Standard deviation and t-test. The study revealed among others that: Auto-mechanics need retraining in 8 out of 10 skills in Auto repair work and all the 10 skills in the use of Auto diagnostic equipment. Based on the findings of the study, four recommendations were made, which include among others the need for government to collaborate with educational institutions to organize training programmes for auto-mechanics based on the identified needs.

Introduction

Every human-being has basic needs and wants. These include food, water, shelter, communication, recreation, protection etc. when people use knowledge, materials and tools to create things that meet their wants and needs, they create technology (Robert and Soman, 1993). Technology is the way people use resources to meet their wants and needs (Brusie, Fales amd Kuetemeyer, 1997). A vehicle is one of such technology and it is any means or device used to transport people, animals or things. Early transportation was slow and crude. People walked and carried what they needed. Improvement came about as people began using animals to ride and to transport goods (Robert and Soman, 1993). The first carry containers were probably just wooden sleds dragged along the ground (Robert and Soman, 1993; Hillier, 1991) until an unknown engineer invented the wheel. According to Vance (2003) and Wikipedia (2006), Nicolas- Joseph Cugnot of France built the first true automobile (self-propelled car) in 1769. The vehicle which was designed as an artillery carriage was a steam-power tricycle capable of carrying four passengers for 20 minutes at 3, 6 kilometers per hour (Vance 2003).

There has been tremendous change in modern car technology. Automobiles have changed more in the last decade than in the previous 60 years (Duffy, 1985). They now use sophisticated computer technology, advanced wiring, intricate circuitry and complex engineering. New cars and trucks are far more complex than they used to be (New York State Automobile Dealers Association (NYSADA, 2006). From 1986 to 1995, cars were equipped with first generation On-Board Diagnostic (OBD-1) systems. Since 1996 cars have been equipped with second generation OBD-2. An auto-mechanics, also called auto-technician,

must be highly skilled in a sense a "jack of all trades" (Duffy, 1985). Gross (2004) posits that, both auto-mechanics and owners are aware of changing technology and feel it is difficult to keep it up. Small backyard or "shade-tree mechanics" have become a fading image of the automotive past (Malone, 2006). Some car owners park their vehicles completely even when faults are minor due to auto-mechanic's inability to diagnose faults because of changes and sophistication of modern automobile. Effective maintenance of today's automobile has become a major challenge to the auto-mechanics. Apparently, it is upon this (effective maintenance) that the life span of the automobile depends to a great extent. According to Narayan (2004), maintenance is a set of preventive, corrective or breakdown rectification activities.

Okorie (2000) stated that for Nigeria to benefit fully from technology, people have to be trained for jobs in the changing world of work. The auto-mechanics who are mostly responsible for effective maintenance of the automobile are trained formally in technical colleges and informally through apprenticeship system. Occupational training is therefore, essential if Nigeria is to utilize modern technology to her advantage. Changes occasioned by technological development obviously demand a commensurable skill adjustment (Okorie, 2000). A number of countries, according to him affected by the impact of new technology clamour that their skills are inadequate for future needs, Nigeria and Niger State in particular are not an exception. The orthodox skills have been rendered valueless, he added. Upon this premise, this study has been designed to identify the training needs of auto-mechanics for effective maintenance of automobiles in Niger State.

Statement of the Problem

Change in auto-technology has made training and re-training of auto-mechanics imperative. Today's auto-mechanics must be specially trained and equipped for On-Board Diagnostic (OBD-2) technology to avoid potential errors in diagnosing car trouble and effecting appropriate repairs (Malone, 2006). The skills possessed by auto-mechanics are obsolete and unnecessary because of rapid changes in technology (Onyeachigbulan, 2004). This has resulted in increasing unemployment rate. The identification and rectification of this unfavorable state of affairs, provides the justification for this research activity.

Purpose of the Study

The purpose of the study was to identify the training needs of auto-mechanics for effective maintenance of automobiles in Niger State. Specifically, the study was designed to identify the training needs of auto-mechanics in:

1. Automobile repairs work.
2. The use of auto diagnostic (On-board/Off -board) equipment.

Research Questions

The following research questions were formulated to guide the study; what are the training needs of auto-mechanics in the following areas:

1. Auto-mechanics in automobile repair work.
2. The use of auto diagnostic (On-board/Off -board) equipment.

Hypotheses

The following hypotheses were formulated based on the problems and tested at 0.05 levels of significance.

1. There is no significant difference between the mean responses of experienced auto-mechanics and less experienced auto-mechanics in the area of training needed in automobile repair work.
2. There is no significant difference between the mean responses of auto-mechanics in training needed in the use of auto diagnostic (on-Board/Off-Board) equipment.

Delimitation of the Study

The study was delimited to auto-mechanics with less than five years working experience as less experienced auto-mechanic, while those with five years and above working experience as experienced auto-mechanic. The Study was also delimited to training needed in the repairs of engine, transmission, braking, steering, suspension, fuel injection systems and the use of auto diagnostic (On-Board/Off-Board) equipment.

Theoretical framework

National Policy on Education (2004) defined Technical Education as the aspect of education, which leads to the acquisition of practical and applied skills as well as basic scientific knowledge. The policy outlined the following as the aims of technical education.

1. To provide trained manpower in applied science, technology and commerce particularly at sub-professional grades;
2. To provide technical knowledge and vocational skills necessary for agricultural, industrial, commercial and economic development;
3. To provide people who can apply scientific knowledge to the improvement and solution of environmental problems for the use and convenience of man;
4. To give an introduction to professional studies in engineering and other technologies;
5. 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 and;
6. To enable our young men and women to have an intelligent understating of the increasing complexity of technology.

The significance of training and retraining of auto-mechanics in the repairs of automobiles in Nigeria cannot be over emphasized. When there is a difference or gap between actual performance and what is needed (the standard), productivity suffers, and training can reduce if this gap is not eliminated. This is done by changing the behavior of the individuals by giving them whatever additional specific items of knowledge, skills or attitude they need to perform up to that standard (Osinem and Nwoji, 2005). Yusuf, Ohanado and Yusuf (2002) defined need as lack of something that if present will improve or increase the welfare of the organism.

Wikin and Altshuld (1995) defined needs assessment as "any systematic approach to setting priorities for future action". According to Kaufman (1985) cited in Muftau (2004) needs assessment involves identifying and justifying gaps in results and placing the gap in prioritized order for attention. Needs assessment can help determine which programmes are needed and what the priorities among these needs should be (Sax, 1980). The use of needs assessment is of great importance in improving the skills needed by auto-mechanics for effective maintenance of automobiles. In relation to continuing professional skill development of automobile technicians for effective maintenance of automobiles, learning is more likely to change in practice when needs assessment has been conducted. This will help us to identify practices in need of improvement and ensure that educational organizational interventions are made to address these needs. Wilkin and Altshuld (1995) conclude "there is no one model of conceptual framework for needs assessment that has been universally accepted, and there is little empirical evidence of the superiority of one approach over another". Ceste (1996) as cited in Muftau (2004) stated that, existing models are so numerous and diverse that criteria for selecting an appropriate approach have been developed. Three basic survey methods for collecting needs assessment data include questionnaires, interviews and the critical incident techniques. Of these, the questionnaire is the most common method of collecting needs assessment data (Muftau 2004).

The use of needs assessment is of great importance in improving the skills needed by auto-mechanics for effective maintenance of automobiles. Ogbuanya (1999) stated that he should be equipped with the knowledge and expertise to properly diagnose maintenance problems, prescribe workable solutions and where necessary, design improved alternative parts and system. This poses a big challenge to the automobile technicians.

Methodology

The study adopted the Survey research design. Survey is a research design that employs the study of large and small populations by selecting and studying sample chosen from the population to discover the relative incidence, distribution and interrelations of

sociological and psychological variables (Olaitan, Ali, Eyoh and Sowande 2000). It involved seeking the views from respondents.

Area of the Study: The study was carried out in six urban towns and six semi urban towns in Niger State. The choice of Niger State was based on the fact that Auto-mechanics in the state face a lot of problems in the maintenance of modern Automobiles as revealed by literature.

population: The population for this study consisted of 302 auto-mechanics operating functional automobile workshop in the three urban towns and three semi urban towns in Niger state. Below is the distribution table.

Table 1: Distribution of Auto-mechanics by Urban and Semi Urban Towns in Niger State

Towns	Auto-mechanics
Bida and Mokwa (Urban)	76
Minna and Suleija(Urban)	85
Kontagora and Rijau(Urban)	69
Katcha and Edati(Semi-Urban)	28
Lambata and Paiko (Semi-Urban)	26
Mashegu and Agwarra (Semi-Urban)	18
Total	**302**

Source: Update of Registered Small and Medium enterprises by Niger state Ministry of Trade, Commerce and Industries and Nigerian Automobile Technician Association (NATA) Niger State Chapter Report 2005.

Sampling and Sampling Techniques: Proportionate stratified random sampling technique was employed to sample 20 experienced Auto-mechanics and 20 less experienced auto-mechanics from the state. 60 experienced auto-mechanics and 60 less experienced auto-mechanics were studied, all together, numbering 120.

Instrument for Data Collection: In this study, a structured questionnaire was employed for data collection. The questionnaire was developed by the researcher. It is divided into three sections A, B, and C. Section A, contains personal information. Sections B, and C which contains 25 item was formulated based on 5-point Likert scale with response categories as Strongly Agree (SA), Agreed (A), Undecided (UD), Disagree (DA), and Strongly Disagree (SD), and assigned numerical values of 5, 4, 3, 2 and 1 respectively.

Validation of Instrument: The instrument was face validated by three lecturers in Department of Industrial and Technology Education, School of Science and Science Education, Federal University of Technology, Minna. Suggestions made by these lecturers were effected on the final copy of the instrument before administering for reliability testing.

Reliability of Instrument: The reliability of the instrument was established using the Cronbach Alpha (α) statistics to establish internal consistency of the instrument after pilot testing of the instrument was carried out in Ilorin town. Thirty auto-mechanics were involved.

Method of Data Collection: Copies of the questionnaire were administered to the respondents by the researcher through personal contact and with the help of two research

assistants and were also retrieved from the respondents by them. A total number of 120 questionnaires were administered, collected and used for the study.

Data Analysis: The data generated from the study was analyzed using Mean, Standard Deviation and t-test.

Results

Research Question 1

What are the training needs of auto-mechanics in automobile repairs work?

Table 1

Mean and Standard Deviation of Responses of Auto-mechanics on Automobile Repair Work.

S/N	Items	X	SD	Remarks
1.	Engine Repairs	4.26	1.13	Agreed
2.	Electronic (computer related) repairs	4.46	0.90	Agreed
3.	Routine maintenance on modern vehicles	4.23	1.29	Agreed
4.	Automatic transmission system repair	4.26	1.18	Agreed
5.	Steering geometry checks and adjustment e.g. toe-in, toe-out camber, castor.	4.20	1.10	Agreed
6.	Repair of disc and drum brakes	3.13	1.42	Undecided
7.	Repair of power steering	3.19	1.37	Undecided
8.	Repair of computer controlled carburetors	3.97	1.30	Agreed
9.	Resetting engine valve to maker's specification using feeler gauge and spanner.	2.41	1.01	Agreed
10.	Fuel Injection system and overhauling	3.93	1.12	Agreed

Table 1 above revealed that 8 out of the 10 items have their mean score ranked above the cutoff point of 3.50 with least standard deviation of 0.90. It therefore means that auto-mechanics need training and retraining in all the aspects of auto-mechanic in automobile repair work and items 6 and 7 which fall within the range of undecided.

Research Question 2

What are the training needs of auto-mechanics in the use of auto diagnostic (On-Board/Off-Board) equipment?

Table 2

Mean and Standard Deviation of Responses of Auto-mechanics in the use of Auto Diagnostic (On-Board/Off-Board) Equipment.

S/N	Items	X	SD	Remark
11.	Use of auto diagnostic equipment to diagnose a faulty internal combustion engine	4.34	0.87	Agreed
12.	Use of auto diagnostic equipment to diagnose a faulty transmission system.	4.70	0.82	Agreed
13.	Use of auto diagnostic equipment to diagnose a faulty gearbox	4.62	0.86	Agreed
14.	Use of auto diagnostic equipment to diagnose a faulty differential Unit.	4.59	0.87	Agreed
15.	Use of auto diagnostic equipment to diagnose a faulty power steering	4.63	0.89	Agreed
16.	Use of auto diagnostic equipment to diagnose a faulty power braking system.	4.33	1.21	Agreed

17. Use of auto diagnostic equipment to diagnose a faulty electrical system.	4.33	1.21	Agreed
18. Use of auto diagnostic equipment to diagnose a faulty cooling system.	4.59	0.94	Agreed
19. Use of auto diagnostic equipment to diagnose a faulty lubrication system.	4.51	1.11	Agreed
20. Use of auto diagnostic equipment to diagnose a faulty fuel system.	4.49	0.95	Agreed

All the 10 items in Table 2 above were rated above cut-off mark of 3.50 with the least standard deviation of 0.82. This revealed that auto-mechanics needs training in the use of auto diagnostic (On-Board/Off-Board) equipment.

Hypothesis 1

HO_1: There is no significant difference between the mean responses of experienced and less experienced auto-mechanics in the retraining needs in automobile repairs work.

Table 3

t-test Comparison of Mean Responses of Experienced and Less Experienced Auto Mechanics on the Retraining Needs in Automobile Repair Work.

Items	$\bar{X}_1$	$\bar{X}_2$	SD_1	SD_2	t-cal	Remarks
Engine repairs	4.15	4.05	1.19	1.14	219	S
Emission diagnosis and repair	4.22	4.15	1.14	1.19	2.05	S
Electronics (computer-related) repairs	4.05	4.43	1.14	1.00	5.35	S
Routine maintenance on modern vehicles	4.02	4.27	1.27	0.97	3.81	S
Automatic transmission system repair	4.43	4.07	1.00	1.10	5.47	S
Steering geometry checks and adjustment.	3.97	4.22	1.23	1.14	4.44	S
Repair of skid control (anti-lock) brake unit	3.90	4.28	1.35	0.90	4.46	S
Repair of power steering	2.98	3.33	1.33	1.35	5.63	S
Repair of computer controlled carburetors	4.43	3.93	0.77	1.13	5.52	S
Fuel injection system overhauling	2.93	3.00	1.39	1.35	1.66	NS

Notation

$\bar{X}_1$ = mean of experienced auto technicians

$\bar{X}_2$ = mean of less experienced auto technicians

SD_1 = Standard deviation of experienced auto technicians

SD_2 = Standard deviation of less experienced auto technicians

N = 60

df= 60-1=59

t-critical = 1.67

The result of the above shows the opinion of experienced auto-mechanics and less experienced auto-mechanics on the training needs of auto-mechanics in area of automobile repair work. It can be seen that all t-calculated values were greater than table value with exception of items 10. Therefore, except for items 10, the null hypothesis is rejected for other items but their opinion on the training needs in auto-mechanic repair works is the same (agreed) based on the high values of their means notwithstanding.

Hypothesis 2

HO_2: There is no significant difference between the mean responses of auto-mechanics in training needed in the use of auto diagnostic (on-Board/Off-Board) equipment.

Table 4

t-test Comparison of Means Responses of Auto-mechanics on Retraining Needs in the use of auto diagnostic (on-Board/Off-Board) equipment.

Items	X_1	X_2	SD_1	SD_2	t-Cal	Remarks
Ignition system adjustment	3.31	3.35	1.32	1.33	0.15	NS
Ignition system repairs	3.85	3.85	1.25	1.29	000	NS
Setting ignition timing light	3.40	3.45	1.33	1.34	0.19	NS
Heating and air conditioning	4.24	4.40	0.98	0.98	0.85	NS
Repair of faulty starter	3.89	3.56	1.30	1.32	0.49	NS
Reviving a faulty electrical system	4.01	4.05	1.07	1.13	0.18	NS
Effective maintenance and repair of charging system.	3.95	3.90	1.12	1.12	0.18	NS

Notation

$\bar{X}_1$ = mean of less experience auto-mechanics

$\bar{X}_2$ = mean of less experience auto-mechanics

SD_1 = standard deviation of less experience auto-mechanics

SD_2 = standard deviation of less experience auto-mechanics

N_1 = 80.

N_2 = 40

$df=N_1+N_2-2=118$

t-critical = 1.66

The table above shows the opinion of respondents on training needs of auto-mechanics in the use of auto diagnostic (On-Board/Off-Board) equipment. The result revealed that, the t-calculated values for all the items (44-52) were less than the table value. Based on this, the null hypothesis is upheld for all the items on the table.

Discussion of findings

The table 1 above revealed that 8 out of the 10 items have their mean score ranked above 3.50 mark, with 2 items within the range of undecided and 8 items from the table recorded high degree of acceptance with mean scores above 4.00 as against the critical value of 3.50 to indicate high acceptance. The table revealed that auto-mechanics lack the high tech skills needed to repair today's vehicle. The findings therefore revealed that auto-mechanics need training and retraining in the area of automobile repair work.

While table 2, provide answers to research question two, which is on training needs of auto-mechanics in the use of auto diagnostic (On-Board/Off-Board) equipment. All the 10 items registered mean scores above 4.00 also indicating a high degree of acceptance. This revealed that auto-mechanics needs training in the use of auto diagnostic (On-Board/Off-Board) equipment.

Recommendations

The following recommendations were made based on findings of the study.

1. The government in collaboration with educational institutions should organize training programmes for auto-mechanics based on the identified needs.
2. The automobile industry should regularly organize training programmes for auto-mechanics on changes or innovations in automobiles.
3. Government should assist auto-mechanics with soft loans to procure modern auto diagnostic equipment and other equipment for their workshops.
4. Auto-mechanics should acquire the high-tech. skills needed for effective maintenance of today's automobile through training and retraining organize by government agencies

Conclusion

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

1. The orthodox skills of auto-mechanics have been rendered valueless by the emergence of computer technology in modern automobiles.
2. Auto-mechanics lack the high-tech skills needed to repair today's automobile.
3. Auto-mechanics lack the knowledge and skill to use auto diagnostic (On-Board and Off-Board) equipment for diagnosis, service and repair of modern automobiles.

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