

ICT Skill Needs for Teaching Emerging Technologies of Automobile Trade in Technical Colleges in Benue State, Nigeria

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Abstract

The study was carried out to determine the ICT skill needed by automobile teachers in teaching emerging technologies in technical colleges in Benue state. Two specific purposes and two research questions were developed for the study. The study adopted descriptive survey design. The area of study was Benue State of Nigeria. The population of the study was thirty six automobile subject teachers drawn from the eight technical colleges and one basic skill centre in Benue state. A 102 questionnaire items was developed for data collection. Three experts validated the contents of instrument. Cronbach Alpha coefficient reliability of 0.94 was obtained for the instrument. Mean and standard deviation were used to answer the research questions while two hypotheses were tested at the 0.05 level of significance. The findings of the study revealed that automobile teachers teaching in technical colleges in Benue State possessed skills in maintenance and repairs of motor vehicle based on old system of detecting and rectification of faults through trial and error process but lack skills in ICT and diagnostic process on emerging technology vehicles to effectively maintain and repair them. The findings also revealed that automobile teachers in technical colleges need further training for skill acquisition in modern vehicle especially in operating and servicing of computerized components and systems. Based on the findings, some recommendations were made, one of which is that automobile teachers teaching in technical colleges should be trained for skill in ICT and emerging Technologies so as to be able to teach in technical colleges.

Keywords: Skills, ICTs, Teaching, Technical Education, Automobiles, Emerging technologies

Introduction

The inclusion of automobile trade among the trade courses offered in technical colleges is aimed at producing skilled technicians for the maintenance of all brands of vehicles. In teaching automobile technology in technical colleges as a trade, certain level of skills in all area of maintenance and repairs of automobile are expected to be acquired by the auto teachers who in turn impart them to the students. Federal Government of Nigeria (FGN) (2013) stated that teachers should be provided with the intellectual and professional background (skills) adequate for their assignment (teaching) and made adaptable to changing situations. This is to satisfy the goal of including automobile trade

in technical college programmes as spelt out by FGN. Thus, the goal of motor vehicle mechanics work (MVMW) programme in technical college is to produce competent vehicle mechanics with sound theoretical knowledge and manipulative skills who should be able to diagnose and carry out repairs and maintenance on all types of formerly, diesel and petrol engines but soon increasingly sophisticated vehicles in the ever changing technology advancement in modern automobile industry (FGN, 2004).

The emergence of modern vehicles also called emerging technology vehicles in automobile technology has brought along with it many challenges among which are the skills required by automobile teachers in ICT and maintenance of the emerging technology

vehicles. These skills are however necessary and needed by automobile teachers if skilled technicians are to be provided for the maintenance of modern vehicles. Skill is the capability of accomplishing a job with precision or certainty, practical knowledge in combination with ability, cleverness and expertness. According to Okeke (2002), skill is the ability to do something expertly and well in accordance to set standard or manufactures instruction. Okeke further stated that to possess skill is to demonstrate the habit of acting, thinking and behaving in a specific way such that the process becomes natural through repetition of practice.

Emerging technologies in automobile technology are those whose operations and control are based on computer operations. Byron (2010), defined emerging technologies as those technical innovations (in automobile) which represent progressive developments within a field for competitive advantage; emerging technologies represent previously distinct fields which are in some way moving towards stronger inter-connection and similar goals. However, the opinion on the degree of impact, status and economic viability of several emerging and converging technologies vary. The teaching of emerging technology skills in automobile in technical colleges should reflect this interconnection and goals.

Teaching is a profession that needs constant training and retraining of teachers especially in emerging technology. According to Allen, Walker and Morehead (1999), many educators are limited in the technological skills needed for successful technological integration in career and technical education curricular due to the lack of recent training in professional field. Rockhill (2005) stated the aims of in-service training to include exposing the trainee to new ideas and innovation in their subject areas providing them with recent trends and development in teacher education, giving

opportunities for teachers to exchange ideas, exploration and experiences among professional colleagues thereby broadening their minds and outlook. According to Ogbaunya and Usoro (2009), the making of technical teachers is not a day job but a continuous one. Apparently, it seems, with the trend of teacher's preparation in Nigeria, technical teachers have been given yesterday's education to tomorrow's citizens.

According to Schwaller (1993), the recent development in teaching is so complicated. In view of this, Schwaller noted that today's automobile teachers and technicians must understand not only the parts, nomenclature, functions and operations but also most importantly the diagnosis and service procedure for each systems. Automobile today is controlled by various electronic sensors, circuits and computers. The automobile service teachers must have sound knowledge of electrical principles and troubleshooting procedures to diagnose and service many electrical problems found on the emerging technologies automobiles (Riovdan & Rossa, 2003). The information revolution of Information and Communication Technology (ICT) is significant in the development of the 21st century. This calls for basic skills in computer operations, programming and handling. It will also promote skills required for automobile maintenance and repairs.

The term maintenance means different things to different people depending on the way it is perceived even within the technical trades in which automobile is one of the major ones (Ogbaunya, 2009). The author further stated that there are three classes of maintenance namely; preventive, predictive and corrective maintenance. Giving insight into the classes of maintenance, Ogbaunya described preventive maintenance activities as including scheduled inspection for early detection and remediation of causes leading

to failure. This causes include adjustment, repairs, replacement of equipment/item, parts regular cleaning, lubrication, (oiling or greasing), painting and servicing at an economic basic at calculated intervals before failure could force an emergence shutdown, planned preventive maintenance reduces the possibility of failure and performance degradation. It also saves time and money. Corrective maintenance is not desirable because it leads to total breakdown in operation which must be avoided.

Statement of the Problem

The aim of establishing technical colleges by Benue State Government in which automobile trade is one of the major trade subjects is to prepare students adequately for successfully entrance into and advancement within the industries and services to self and society. To fulfill the aim successfully, the automobile teachers in the technical colleges must all the times be abreast and in-tune with emerging technologies, its curriculum contents and must have suitable skills in pedagogy as well as good knowledge of ICTs which is the key to the operation of modern vehicle and equipment especially those in the area of maintenance and repairs of faults in automobiles.

As the situation is now in technical colleges in Benue State, however, it seems that lack of modern automobile technology knowledge, competencies and skills by automobile teachers most especially on emerging technologies in automobile seem to be responsible for the students being restricted in skills, efficiency, proficiency and productivity hence the rate at which unemployment is increasing at very dangerous and alarming rate. It is for this reason that this study on skill needs of automobile teachers in teaching emerging technologies in automobile in technical colleges in Benue state is being undertaking

to determine and identify critical areas of skill updating by automobile teachers.

Purpose of the Study

The main purpose of this study was to determine the skills needed by automobile teachers in teaching emerging technologies in technical colleges in Benue State. Specifically, the study is to:

1. identify ICTs skills needed by automobile teachers in teaching emerging technologies in technical colleges in Benue state.
2. determine suitable pedagogical skill by automobile teachers in teaching emerging technologies in technical colleges in Benue state.

Research Questions

1. What are the ICTs skills needed by automobile teachers in for teaching emerging technologies in technical colleges in Benue State?
2. What are the suitable pedagogical skills needed by automobile teachers in teaching emerging technologies in technical colleges in Benue state?

Hypotheses

The following null hypotheses were tested at 0.05 level of significance:

- 1: There is no significant difference between the mean response of automobile teachers in urban and rural areas on skill needs in emerging technologies by automobile teachers.
- 2: The mean responses of automobile teachers in urban and rural areas do not differ significantly on ICT skills needed for teaching of emerging technologies in technical colleges in Benue State.

Method

Design of the Study

This study adopted descriptive survey design. Ezeji (2004) defined descriptive survey research design as the one which involves the assessment of public (a part or the whole population) opinion using

collection of detailed description of existing phenomena with the intent of using the data to justify current conditions and practices or to make better plans for improving phenomena. It assesses the present practices, compares it with set standards and suggests ways of improving on the existing practices, (Owens, 2002, Uzoagulu, 2011,). This study possesses the same characteristics and attributes with survey design using questionnaire to get public opinion, the intended improvement of skills by automobile teachers, assessing the skills training needs of automobile teachers in emerging technologies and for skill upliftments. This therefore makes the survey design most appropriate for the study.

Area of the Study

The study was conducted in Benue State. Benue State is divided into 3 senatorial zones A, B and C. There are 8 science and technical colleges and one trade centre located in different parts of the State. All automobile teachers in these science and technical colleges were used for the study. Benue State is adjourn to be the food baskets of the nation, the food is produced in rural areas and then brought to urban areas by transportation, the state therefore needs well maintained vehicles for its transportation of goods and services. The State also is a civil service State, these civil servants or workers owned vehicles and these vehicles needs effective maintenance to be able to serve its workers better.

Population for the Study

Population for this study was 38, made up of automobile teachers in technical colleges located in rural and urban areas in Benue State. The 38 automobile teachers were drawn from all the 8 technical colleges and trade centers as obtained from the Benue State Ministry of Science and Technology Education. There was no sampling because of the management size of the automobile teachers.

Instrument for Data Collection

The instrument for data collection for this study was a questionnaire. The instrument was divided into two parts; 1 and 2. Part 1 sought information on personal data of the respondents while part 2 sought information from the respondents that were relevant to answer research questions. Part 2 was sub-divided in 5 sections in line with the specific purposes of the study.

Validation of the Instrument

The instrument for this study was subjected to face validation by three experts in the Department of Industrial Technical Education, Faculty of Vocational and Technical Education, University of Nigeria, Nsukka. The experts were supplied with necessary document and information such as the topic of the study, purpose of the study, research question and hypotheses to aid the process of validation. The experts were requested to freely comment on items with reference to good communication of ideas, facts, clarity, correctness and their appropriateness in addressing the purposes of the study. Based on their comments and input, the final copy of the instrument was developed for the study. Before the validation, there were 105 items and after the validation, the number of items were reduced to 101.

Reliability of the Instrument

The reliability of the instrument was determined using Crombach Alpha (α) reliability technique. The area of pilot-testing was three technical colleges in Nasarawa State, where twenty (20) copies of the questionnaire were administered on automobile teachers and 0.89 reliability coefficient was obtained.

Method of Data Collection

The researcher employed the services of two research assistants to help in administering and collecting the instrument. The researcher handled the administration and collection of the instrument in zone A; 5

technical colleges. The two assistants one each handled zone B and zone C; 4 technical colleges and 3 technical colleges respectively. At the end of the collection exercise, a total number of 36 copies of questionnaire giving a short-fall of two questionnaires from 38 respondents. This therefore represents 94 percent return rate.

Method of Data Analysis

The data collected for this study was analyzed using mean and t-test. Mean was used to answer the two research questions while t-test was used for testing the two hypotheses at 0.05 level of significance. Any item with a mean value of 3.50 or above was

regarded as disagree while any items with a mean value less than 3.50 was regarded as disagree. For acceptance of hypothesis, the null hypothesis was accepted for any item whose p-value was greater than the 0.05 but it was rejected for any item that had less than 0.05.

Results

Research Question 1

What are the skills needs of automobile teachers in ICT for teaching emerging technologies in technical colleges in Benue State?

Table 3

Mean and Standard Deviation of Respondents Responses on Skill Needs of Automobile Teachers in ICT for Teaching Emerging Technologies in Technical Colleges in Benue State

S/N	Items	\bar{x}	SD	Remark.
59	Knowledge of computer hardware	4.56	0.65	VHN
60	Knowledge of computer software	4.69	0.57	VHN
61	Knowledge of logging information in the computer	4.50	0.77	VHN
62	Programming Computer	4.47	0.77	HN
63	Retrieval of information	4.50	0.84	VHN
64	Identify Computer signals	4.56	0.69	VHN
65	Interpret computer signals	4.58	0.64	VHN
66	Read trouble codes on computer vehicle model system	4.50	0.65	VHN
67	Examine and adjust computer on running vehicles	4.44	0.73	HN
68	Diagnose and repair computer problem in computerized vehicles	4.50	0.60	VHN
69	Use computer skills to keep vehicle, in good operation condition	4.67	0.63	VHN
70	Identify and use relays to execute computer commands that are independent of sensors (input), control unit and actuators (output)	4.44	0.77	HN
71	Scan and control computer problems in a computerized automobile vehicles	4.44	0.77	HN
72	Carry out basic tests and repairs on computer system using computer animation	4.42	0.73	HN
73	Access larger networks and work on microprocessors on on-board diagnosis (OBD)	4.42	0.69	HN
Cluster mean		4.51	0.56	VHN

Results in Table 1 showed that the following skills are very highly needed (VHN) by automobile teachers in ICT for

teaching emerging technologies; Knowledge of computer hardware (4.56), Knowledge of computer software (4.69), Knowledge of

logging (4.50), Retrieval of information (4.50), Computer signals (4.56), Interpretation of computer signals (4.58), Read trouble codes on computer vehicle model system (4.50), Diagnose and repair computer problem in computerized vehicles (4.50) and Use computer skills to keep vehicle, in good operation condition (4.67).

However, result showed that the following skills are highly needed (HN) by automobile teachers in ICT for teaching emerging technologies: Computer programming (4.47), Examine and adjust computer on running vehicles (4.44), Identify and use relays to execute computer commands that are independent of sensors (input), control unit and actuators (output) (4.44), Scan and control computer problems

in a computerized automobile vehicles (4.44), Carry out basic tests and repairs on computer system using computer animation (4.42) and Access larger networks and work on microprocessors on on-board diagnosis (OBD) (4.42). The cluster mean of 4.51 with a standard deviation of 0.56 showed that the automobile teachers in technical colleges in Benue State very highly needed (VHN) ICT skills for teaching emerging technologies in technical colleges in Benue State.

Research Question 2

What are the suitable pedagogical skill needs of automobile teachers in teaching emerging technologies in technical colleges in Benue State?

Table 4

Mean and Standard Deviation of Respondents Responses on the Suitable Pedagogical Skill Needs of Automobile Teachers in Teaching Emerging Technologies in Technical Colleges in Benue State (N = 36)

S/N	Items	\bar{x}	SD	Remark.
74	Examine the curriculum of the training programme	4.33	0.63	HS
75	Select and adopt relevant methods for content delivery	4.42	0.69	HS
76	Specify instructional concepts in learnable units	4.36	0.54	HS
77	Select and emphasis appropriate techniques for instructional delivery	4.44	0.55	HS
78	Adopt demonstration method	4.47	0.56	HS
79	Adapt of observation method.	4.33	0.67	HS
80	Engage in laboratory practical project sessions.	4.39	0.64	HS
81	Individualized instruction method.	4.25	0.69	HS
82	Group study during practical lessons.	4.28	0.84	HS
83	Up-skilling of students in out of class tasks.	4.39	0.72	HS
84	Use of ICT for instructional purposes.	4.42	0.69	HS
Cluster mean		4.37	0.43	HS

The result revealed highly suitable (HS) pedagogical skill needs of automobile teachers in teaching emerging technologies in technical colleges. The cluster mean of 4.37 with standard of 0.43 means that the items in Table 2 are highly suitable (HS) pedagogical skill needs of automobile teachers in teaching

emerging technologies in technical colleges in Benue State.

Hypotheses 1

The mean responses of automobile teachers in urban and rural areas will not differ significantly on skill needs of automobile teachers in ICT for teaching of

emerging technologies in technical colleges in Benue State.

Table 6

t-test Analysis of the Mean Responses of Automobile Teachers in Urban and Rural Areas on their Skill Needs in ICT for Teaching of Emerging Technologies in Technical Colleges in Benue State

S/N	Item Statement	Location	Rural = 12,		Urban = 24		Sig	Dec																																																																																																																																																																																				
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		Urban	4.67	0.56					60	Knowledge of computer software	Rural	4.58	0.66	-0.81	34	0.42	NS	Urban	4.75	0.53	61	Knowledge of logging	Rural	4.33	0.98	-0.91	34	0.37	NS	Urban	4.58	0.65	62	Computer programming	Rural	4.08	0.90	-2.25	34	0.03	S	Urban	4.67	0.63	63	Retrieval of information	Rural	4.42	0.90	-0.41	34	0.68	NS	Urban	4.54	0.83	64	Computer signals	Rural	4.42	0.90	-0.85	34	0.40	NS	Urban	4.63	0.57	65	Interpretation of computer signals	Rural	4.33	0.88	-1.68	34	0.10	NS	Urban	4.71	0.46	66	Read trouble codes on computer vehicle model system	Rural	4.17	0.57	-1.29	34	0.03	S	Urban	4.67	0.63	67	Examine and adjust computer on running vehicles	Rural	4.17	0.71	-1.64	34	0.11	NS	Urban	4.58	0.71	68	Diagnose and repair computer problem in computerized vehicles	Rural	4.25	0.62	-1.79	34	0.08	NS	Urban	4.63	0.57	69	Use computer skills to keep vehicle, in good operation condition	Rural	4.33	0.88	-2.38	34	0.02	S	Urban	4.83	0.38	70	Identify and use relays to execute computer commands that are independent of sensors (input), control unit and actuators (output)	Rural	4.25	0.96	-1.07	34	0.29	NS	Urban	4.54	0.65	71	Scan and control computer problems in a computerized automobile vehicles	Rural	4.17	0.93	-1.56	34	0.13	NS	Urban	4.58	0.65	72	Carry out basic tests and repairs on computer system using computer animation	Rural	4.25	0.86	-0.97	34	0.34	NS	Urban	4.50	0.65	73	Access larger networks and work on microprocessors on on-board diagnosis (OBD)	Rural	4.08	0.66	-2.15	34	0.04	S	Urban	4.58	0.65	Cluster mean		Rural	4.28	0.68	-1.85	34	0.07	NS			Urban
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Hypotheses 2

There will be no significant difference between the mean responses of automobile teachers in urban and rural areas

on skill needs in emerging technologies by automobile teachers.

Table 5

t-test Analysis of the Mean Responses of Automobile Teachers in Urban and Rural Areas on their Skill Needs in Emerging Technologies

S/N	Item Statement	Location	Rural = 12,		Urban = 24		Sig	Dec
			\bar{x}	SD	t-cal	df		

1	Diagnose Engine and correct for peak performance	Rural	3.33	0.88	-2.61	34	0.01	S
		Urban	4.08	0.77				
2	Dismantling and assembling engine for high performance	Rural	3.50	0.79	-2.04	34	0.05	S
		Urban	4.21	1.06				
3	Carrying out complete engine tune-up-overhaul	Rural	3.58	0.90	-1.36	34	0.18	NS
		Urban	4.08	1.10				
4	Remove and replace pistons, rings valves and con. rod.	Rural	3.83	0.93	-1.72	34	0.10	NS
		Urban	4.33	0.76				
5	Diagnose, overhaul and assemble carburetor	Rural	3.83	0.83	-0.94	34	0.36	NS
		Urban	4.13	0.90				
6	Maintenance and repairs of systems	Rural	3.67	0.65	-1.40	34	0.17	NS
		Urban	4.04	0.80				
7	Maintenance of Fuel system	Rural	3.75	0.62	-1.94	34	0.06	NS
		Urban	4.29	0.85				
8	Overhaul of Ignition system	Rural	3.58	0.66	-1.44	34	0.16	NS
		Urban	4.00	0.88				
9	Repairing of Brake system	Rural	3.75	0.62	-2.59	34	0.01	S
		Urban	4.42	0.77				
10	Overhaul of Steering system	Rural	3.67	0.77	-1.46	34	0.15	NS
		Urban	4.17	1.04				
11	Repair of Transmission system	Rural	3.42	0.90	-2.21	34	0.03	S
		Urban	4.08	0.83				
12	Maintenance of Charging system	Rural	3.33	1.07	-1.96	34	0.06	NS
		Urban	3.96	0.80				
13	Servicing of Lightening system	Rural	3.08	0.90	-2.41	34	0.02	S
		Urban	3.96	1.08				
14	Servicing of Cooling/ Lubricating system	Rural	3.75	0.45	-2.02	34	0.05	S
		Urban	4.25	0.79				
15	Skill on Adjustment	Rural	3.83	0.38	-1.26	34	0.22	NS
		Urban	4.17	0.86				
16	Servicing of Valves	Rural	3.42	0.79	-2.75	34	0.01	S
		Urban	4.17	0.76				
17	Adjustment of Spark plug	Rural	3.92	0.51	-1.90	34	0.07	NS
		Urban	4.42	0.83				
18	Adjustment of Contact point	Rural	3.75	0.62	-1.51	34	0.14	NS
		Urban	4.13	0.74				
19	Servicing of Clutch	Rural	3.75	0.75	-1.81	34	0.08	NS
		Urban	4.25	0.79				
20	Servicing of Injectors	Rural	3.08	0.51	-1.36	34	0.18	NS
		Urban	3.58	1.21				
Cluster t		Rural	3.59	0.52	-2.67	34	0.01	S
		Urban	4.14	0.60				

Discussion of Findings

The findings regarding skill needs of automobile teachers in ICT as presented in Table 1 showed that out of 15 items, 10 showed very highly needed (VHN) while 5 were highly needed (HV). This implies that with emerging technological vehicles, ICT plays very significant role. This is in agreement with what most experts express in their views. According to Nice (2002), ICT incorporated on the emerging technologies vehicles bring the control of vehicle nearer to the driver. It is therefore, important that

automobile teachers can hardly teach anything to students in the present technological transformation if automobile teachers do not have technological skills in ICT.

Concerning the findings on suitable pedagogical skill need of automobile teachers in Technical Colleges in Benue State as presented in Table 2, all the 11 items showed that automobile teachers need suitable pedagogy skills in teaching emerging technologies. A teacher may have pedagogical skills but when it comes to

applying suitable skills as the emerging technologies demand, the teacher may be found wanting. By implication of the findings, automobile teachers need highly suitable (HS) pedagogical skills to teach in Technical colleges in Benue State. This is in agreement with the view of experts in the trade as can be seen below. According to Seymour (1993), this approach belief merely develop a generation of people who will make a great game-show contestants but does a little to provide future adult citizens with needed problem solving skills. It only develops rule-based learners in an era that needs model based reasoners and system thinkers. This has also been confirmed by the results of the hypothesis two.

Conclusion

Based on the findings of this study, it is concluded that automobile teachers teaching in technical colleges in Benue State, Nigeria need skills in ICT and emerging technologies for effective teaching, maintenance and repairs of modern vehicles in technical colleges in Benue State. There is, therefore, an urgent need to improve skills of automobile teachers. This is necessary in order to teach the students who would service and repair these vehicles with emerging technologies with its sophistication, complexities of systems and components effectively.

Implications

The educational implications of this study are: the automobile teachers when improved in skill acquisition in the area of ICT and emerging technologies would teach effectively. When automobile teachers skills are improved, automobile students will be able to maintain and repair emerging technologies vehicle components and systems very well on graduation. When automobile students under such improved skilled teachers graduate, they would become economically self-reliant.

Recommendations

Researcher made the following recommendations;

- i. There should be in-service training on ICT and emerging technologies vehicles. The administrators should organize workshops and seminars where automobile teachers could be trained by experts on ICT and emerging technologies vehicles systems and components.
- ii. Automobile teachers should be granted scholarship inform of study leave with pay, to further their education most especially in ICT and emerging technologies in automobile.
- iii. New technological development having implications for automobile such as ICT and emerging technologies should be integrated into the skills and learning contents of the curriculum of technical education programme.

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