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Competency needs of motor vehicle mechanics lecturer's in auto fuel and air conditioning system at some colleges of education in North-Eastern, Nigeria

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Abstract
The study was conducted to determine the competency need of motor vehicle mechanics lecturers in auto fuel and air conditioning system at college of education level north-eastern Nigeria. To achieve the purpose of this study, three objectives, research questions and hypotheses were tested at 0.05 level of significant. Survey research design was employed for the study. It comprises all 75 motor vehicle mechanics lecturers and technologists in auto fuel and air conditioning systems made the population of the study. A structured of auto fuel and air conditioning system mechanics lecturers/technologist's competency need questionnaire (AAMLTCNQ). Ware used for data collection. A pilot test of the instrument was carried out in FCE Pankshin, Plateau state. The reliability of the instrument was established by Cronbach Alpha and 0.81 co-efficient was obtained. Data collected were analyzed using mean scores and standard deviation and independent t-test was used in testing hypotheses. The result of the analysis showed that the practical skills and attitude competency is highly needed among motor vehicle mechanics, the communication skills competency is needed among motor vehicle mechanics lecturers, and the evaluation techniques competency is low needed among motor vehicle mechanics lecturers. it was also found that there is significant difference in the mean ratings of motor vehicle mechanics lecturers and technologists on the competency need motor vehicle mechanics lecturers in the practical skills and attitude, classroom/workshop communication skills and relevant evaluation tools and techniques. The recommended among others that training regular workshop, seminars be organized on periodically in different innovation of relevant evaluation tools and techniques. And also recommended is that relevant stake holders in education sector such as TEPAN and NCCE should initiate research in finding ways for developing competency needed in in test and measurement as well as communication skills in auto fuel and air conditioning system.

Keywords: Competency needs, practical skills and attitude, communication skills, evaluation techniques, mechanics lecturers, auto fuel and air conditioning system

Introduction

Technical and Vocational Education and Training (TVET) is a system of education whereby young individuals are given apprenticeship training to prepare them for job. This was originated long ago in Nigeria as Umunadi (2023) [20] stated that even before the arrival of the British colonial government vocational and technical education was formally and informally done through the system of apprenticeship where aged and under aged were trained to master craft practice of various skills such as carpentry, masonry, blacksmith, foundry, carving, textile design and dyeing. He further stated that, the trainee usually spends about three to seven years before the program is completed depending on his/her ability, competence and hard work.

It is generally believed that Technical and Vocational Education has the potential of addressing the economic problems faced by many countries because of its impact on human resources and economic development. Federal Republic of Nigeria [FRN] (2013) describes Technical and Vocational Education as a comprehensive term referring to those aspects of the educational process involving in addition to general education, the study of technologies and related sciences. Additionally, Aina, Ogundele & Olanipekun (2023) further described technical education as "an aspect of education, which leads to the acquisition of practical, basic scientific knowledge, involves special manipulative skills, creative minds, and attitudes relating to occupations in various sectors of the economic and social life".

The graduates of Colleges of Education (Technical) are awarded the Nigeria Certificate in Education (Technical). This certificate is now regarded as the minimum teaching qualification in primary schools. NCE (Technical) programs are expected to prepare competent technical teachers that can impact basic technical knowledge and skills to junior secondary school's students (NCCE, 2020) [6]. The objectives of NCE (T) program as contained in the National Commission for Colleges of Education (NCCE) Minimum standard (NCCE, 2020) [11] includes: -

1. Producing qualified Technical Teachers and practitioners of technology capable of teaching Basic Technology in junior Secondary Schools.
2. Producing NCE (Technical) Teachers who will be able to inculcate scientific and Technological attitudes and values into the society.
3. Producing qualified Technical Teachers motivated to start the so much desired revolution of Technological development right from the Nigerian Schools.
4. Preparing Technical Teachers to qualify them for a post-NCE degree programme in Technical Education.

Accordingly, Okoye & Arimonu (2016) [12] mentioned that NCE (Technical) teacher education programme is specially set-up for the training and preparation of teachers in various

subjects relating to technology such as Metalwork Technology, Electrical/Electronic Technology, Building Construction Technology, Woodwork Technology and Automobile Technology.

Automobile Technology is a professional area of specialization that involves the application of scientific knowledge in the design, selection of materials, construction, operation and maintenance of the automobile. Hartman (2024) described an automobile as a self-propelled, trackless, non-articulated, four-wheeled land vehicle which includes passenger cars, recreational vehicles, taxi sand buses used to transport people and goods from one place to another. Automobile Technology is one of the technology education areas taught at the Nigeria Certificate in Education (NCE) Technical programme in Nigeria. The objective of Automobile Technology at NCE programme is to prepare students to become automobile repair professionals and teach technical subjects in schools, for example Automobile Technology.

Chouinard (2016). Stated that need is expressed as the capacity to reach a condition or to perform a task according to a required minimal level of satisfaction this means the motor vehicle lecturers' possession of knowledge, skills and abilities needed to satisfy the special demands of lecturing auto fuel and air condition system. Jailani and Ningtiyas (2018). Viewed that lecturers' competence influence values, behavior, practical skills, communication skills, goal, and teaching practice. Therefore, various efforts are needed to improve lecturers 'and technologist competence including content knowledge competency, pedagogical competency. Hence, you need to investigate competencies need for motor vehicle mechanics lecturers in Auto fuel and air conditioning system of north-eastern Nigeria.

Lecturer's Practical skills and attitude Competency

Competence refers to the knowledge, skills and attitudes or personal values needed to perform a task and responsibility in accordance with specifications and requirement (Awang & Wahab, 2016). Based on the definition and Competency Model "Iceberg", it can be concluded that teacher competence in teaching practice is a combination of knowledge, skills and attitudes.

In carrying out the practice of teaching practice effectively. The concept paper refers to all three of these components as teacher competence that affect practical practice lessons during the workshop (Osman, Kob, & Abdullah, 2019) [21]. According to Harun (2024). Said that Teachers' competent in carrying out their teaching practical subject's regulation is urgently needed to meet the National Education Philosophy (NEP) who wants to pupils integrated in selected developed produce a balanced and harmonious. Technical and vocational teachers nowadays need to equip themselves with the skills to cope with globalization in education.

The term 'attitude' has received varied definitions which have been suggested in different education disciplines; including psychology and social science (Sadhana, 2017). Evidence exists that shows an interrelationship between learners' beliefs and their attitudes. The attitudes towards science practical are described as a more purposeful manner of putting together a wide range of beliefs concerning science that gives room for one to predict the way of science. Learner attitude toward practical science, however, may be conceived as a wide variety of beliefs that are held by learners towards practical science (Ackon, 2024).

According bertmant (2017) he identifies two component such as practical skills and attitude

1. Integration processes between knowledge and skills

1. Low-road integration
2. High-road integration
3. Transformative integration

2. Integration processes of attitude

a. Attitudes and attitude development
b. Low, high and transformative integration of attitudes

Lecturers Competency Classroom/workshop Communication Skills

The word communication originates from the Latin expression "comunis", which means "common". Its derivative "communicate", means "sharing", "imparting", or "partaking" (Enyi & Egomo, (2018). Communication involves skills which are of verbal and non-verbal forms.

Verbal communication essentially depends on speech, that is, the way things that need to be said are said. This means the ability of the lecturers to adjust his/her speech to a variety in or influence the behavior of students by way of instruction or orders, persuasion and propaganda. The non-verbal communication skills involve the use of the body. According to Umeano (2019). Bodily posture, physical proximity, gestures, facial expressions, eye contact and voice are some of the non-verbal skills which communicate social signals and messages. In the view of Okwlle (2019). The lecturers are supposed to be the repository of knowledge. Also, the lecturers are assumed to have requisite skills for transferring or communicating the knowledge to the learners through the Application of sound instructional techniques and the effective utilization of instructional materials/aids. For the automobile lecturers to effectively deliver the curriculum, he/she must be able to blend these forms of communication during instruction. How the curriculum content is learnt depends primarily on the communication skills competencies of the lecturers in support of the above assertion,

Okwor (2026) has this to say: A total package of communication in the classroom must appeal to all human senses for effective teaching and learning. This is the relevance of the use of teaching aids Pictures and charts, objects, and even bodily movements among others. A good automobile technology lecturer is one who exploits everything in the classroom environment to maximize teaching and learning. This is why the teacher must be a role model and an inspirer, very knowledgeable in the subject matter as well as in the methodology of imparting such knowledge. Since modern communication is essentially interactive, the lecturers must involve learners in all classroom activities so that they learn by doing and not just be hearing. The lecturers must, therefore, make the learners to speak, read and write in the classroom, in addition to listening to the and also to one another, deducing from the above assertion, classroom communication channels: students-teacher, student-student interactive sessions could be used by the motor vehicle mechanics lecturer to deliver the basic principles component of air condition system i.e. compressor, condenser and evaporator etc. However, this

could only be achieved if the lecturers possess the needed communication competencies, hence the need for this study.

Specific Objectives

The main aim of this study is to find out the Competency needs of motor vehicle mechanics lecturers and technologists in Auto fuel and air condition system at colleges of education in northeastern Nigeria. Specifically, the study:

1. Examine the competency needs of motor vehicle mechanics lecturers and technologists in practical skills and attitude of auto fuel and air conditioning system at college of education.
2. Determine the competency needs of motor vehicle mechanics lecturers and technologists in communications skills of auto fuel and air conditioning system at college of education.
3. Determine the competency needs of motor mechanics lecturers and technologists in evaluation techniques of auto fuel and air conditioning system at college of education.

Methodology

A survey research design was used in this study to examine the variables under investigation. A survey research design is a procedure in quantitative research in which investigators administer a survey or questionnaire to a sample or to the entire population of people to describe the attitude, opinions, behavior or character of the population (Creswell 2012). The present study is therefore interested in using questionnaire to study the opinions and attitude of motor vehicle mechanics lecturers and technologist of colleges of education in Northeastern Nigeria regarding their Competency needs of motor vehicle mechanics lecturers and technologists in Auto fuel and air condition system at colleges of education in northeastern Nigeria. Hence, a survey design was appropriate for achieving this.

The Population of the study comprised of all colleges of education lecturers and Technologists in Automobile Technology Education at Colleges of Education level in the Northeastern Nigeria. Lecturers and Technologist in Automobile Technology education were considered in this study because the course (TEA 322 Auto fuel and air conditioning) contain theory and practical. Hence, lecturers handle theoretical aspect and Technologist handle practical aspect.

The sample of this study comprised 70 lecturers and technologist in automobile technology at colleges of education in North-eastern Nigeria. The sample was drawn from Krecie and Morgan table for determining the sample size because the table provides the generalized scientific guideline for sample size decisions. Even though Krecie and Morgan (1970) recommended that 63 participants are adequate to represent the entire population of 75 (see, Appendix C). But the present study increased the sample size to 70 respondents in order avoid of sample size errors. This is in line with Offor (2025) who suggested that a researcher can increase his/her sample size by up to 40% to avoid non-response problems and sample size errors.

A Simple random sampling technique was used in the present study because this sampling technique was believed to produce samples which are free from bias (Mustapha, 2018). Following this argument, the present study used simple random sampling techniques to minimize the issue of bias. The procedures followed in drawing the sampled lecturers and technologist are as follows: in each college of education, the researcher wrote the names of all Motor vehicle mechanics lecturers and technologist on pieces of paper which were folded and thoroughly mixed in a container. The researcher then dipped his hand without looking into the container and selected any piece of paper. The researcher unfolded the paper and the name on the paper was recorded. The paper was refolded and returned to the container for the next draw to give all the elements of the population equal chance of being included in the sample of the study (Uzoagulu, 2024). Any paper or name drawn once was ignored if it was picked on the subsequent occasions (Uzoagulu, 2024). This process was repeated until the required numbers of Lecturers and Technologist were selected in each college of education.

The study adapted measurement of five constructs from the previous studies (see, for example, Offor, 2025; Muhammed, 2018). The five constructs include practical skills and attitude competencies (19 items), communication skills competencies (12 items) and evaluation techniques competencies (8 items). The measurements of these constructions were adapted because Churchill (1979) recommended that a researcher can adopt or adapt measurement from the prior studies relevant to the current research. The respondents were asked to indicate their responses to each question on a five-point scale that is, 1 =Very Low Needed, 2 = Low Needed, 3 = Needed 4 = highly Needed, 5 = Very Highly Needed (see, appendix C for details). Kronick and Fabregas (2017) suggested that a scale between five and seven points is more reliable than higher or lower scale and a scale with no midpoint may increase the measurement error, similarly, Darves (2018) states that a five or seven scale is likely to produce better results.

Finally, for cleaning data and analysis, Statistical Package for Social Science (IBM, SPSS) 25 was used throughout the process to run the mean, standard deviation and independent samples t-test was used to test the hypotheses of the study. The independent samples t-test is a statistical tool for comparing the mean score of two different groups (Tabachnick & Fidell. 2017). All the hypotheses of this study are for difference between two groups (i.e. lecturers and technologists). Hence, independent samples t-test was appropriate in testing the hypotheses of this study.

The benchmark of five points Likert scale is 3.0 (Okolocha & Nwadiani, 2015). Following their recommendation, any item of questionnaire with mean value of 3.0 and above was considered agree while any item with mean value of less than 3.0 was considered disagree. Additionally, any null hypothesis with a P-Value of less than 0.005 was rejected while any null hypothesis with a P-Value of 0.005 and above was accepted.

Results

Research Question One: To what extent the practical skills and attitudes of competency needs of motor vehicle mechanics lecturers and technologists in auto fuel and air conditioning system at colleges of education?

Descriptive statistics of all the items measuring the practical skills and attitude competency needs of motor vehicle mechanics lecturers and technologists were calculated and the overall mean and standard deviation for the variable is also computed as presented in Table 1. The statistical

findings indicate that the practical skills and attitude competency are highly needed among motor vehicle mechanics lecturers as the mean scores of all measurement items of lecturers' practical skills and attitude competency are above 3.0. The mean scores of items range from 2.96 to 4.25. The grand mean of lecturers' practical skills and attitude is 3.79 with standard deviation of 0.990, while the mean scores of technologists' practical skills and attitude competency are ranging from 3.00 to 4.25 with a grand mean of 3.78 and standard deviation of 0.995. This also indicated that both lecturers and technologists highly need practical skills and attitude competency.

Lecturers Technologists

Table 1: Mean ratings and standard deviation of motor vehicle mechanics lecturers and technologists' responses on the extent of practical and attitude skills competency needs of motor vehicle mechanics lecturers and technologists in auto fuel and air conditioning system at colleges of education.

S/n	Items	Mean	Std deviation	Remarks	Mean	Std deviation	Remarks
1.	Demonstrate ability to add some refrigerant to the systems	4.02	0.601	HN	4.00	0.632	HN
2.	Ability to Check and set carburetor	3.63	1.282	HN	4.00	0.966	HN
3.	Ability to servicing of carburetor	3.94	0.932	HN	3.88	0.957	HN
4.	Ability to replace of faulty injector	4.17	0.781	HN	4.13	0.806	HN
5	Ability to replace of faulty nozzle	3.79	1.637	HN	3.69	0.702	HN
6.	Demonstrate ability to open the hood	3.71	1.166	HN	3.63	1.204	HN
7.	Ability to display competence in locating the lower pressure feeding side	3.81	0.982	HN	3.75	1.000	HN
8.	Ability to illustrate skills in inserting the gauge to the lower feeding side of air conditioning systems	3.46	1.352	N	3.44	1.365	N
9.	Ability to check the reading on the gauge (if the reading is zero the refrigerant has leaked off)	3.90	0.778	HN	3.88	1.806	HN
10.	Ability to show skills in the use of ultraviolent leak dye in pipe gas	3.42	1.334	N	3.38	1.408	N
11.	Ability to demonstrate ability to dissemble systems and sub system fuel systems	3.54	0.874	HN	3.56	0.892	HN
12.	Ability to pour soapy water on top of the air condition system	3.98	0.635	HN	4.00	0.632	HN
13.	Display ability to check for bubbles and locate the leak in air conditioning systems	4.17	0.781	HN	4.13	0.806	HN
14.	Ability to diagnose faulty compressor	3.90	0.881	HN	3.88	0.885	HN
15.	Ability to diagnose faulty compressor	3.90	0.881	HN	3.88	0.885	HN
16.	The use of a system to identify the components of auto fuel and air condition system	3.60	0.962	HN	3.56	0.964	HN
17.	Ability to initiate working on a display fault of air condition system	2.96	1.271	N	3.00	1.265	N
18.	Ability to read the fault observed in air conditioning systems	4.02	0.601	HN	4.00	0.632	HN
19.	Ability to select right test tool to carry out a test sequence in air conditioning systems	4.25	0.978	HN	4.25	1.000	HN
	Cluster Mean	3.79	0.990	HN	3.78	0.995	HN

Hypothesis 1

There is no significant difference in the mean ratings of lecturers and technologists on the practical skills and attitudes competency needs of motor vehicle mechanics lecturers in auto fuel and air conditioning systems.

Table 2: Independent t-test analysis of the mean ratings of Motor Vehicle Mechanics Lecturers on lecturers' competency need in practical skills and attitudes.

Group	N	Mean	Standard Deviation	T	Significance	Remarks
Lecturers	47	3.79	0.990	27.078	0.0000	Significant
Technologists	16	3.78	0.995			
Total	63					

Indicates that the t-value of 27.078 is statistically significant on the 0.05 (two-tailed) test. The null hypothesis is therefore rejected, with a conclusion that there is a significant difference in the mean ratings of Motor Vehicle Mechanics Lecturers and Technologists on the practical skills and attitudes competencies need of Motor Vehicle Mechanics lecturer in auto fuel and air condition system.

Research Question Two: To what extent the communication skills competency needs of motor vehicle mechanics lecturers and technologists in auto fuel and air conditioning system at colleges of education?

Descriptive statistics of all the items measuring the communication skills competency needs of motor vehicle mechanics lecturers and technologists were calculated and the overall mean and standard deviation for the variable is also computed as presented in Table 3. The statistical findings showed that the communication skills competency is needed among motor vehicle mechanics lecturers as the mean scores of all the measurement items of lecturers' communication skills competency are below 3.0. The mean scores of items range from 1.15 to 4.42. The grand mean of lecturers' communication skills is 2.60 with standard deviation of 0.849, while the mean scores of technologists' communication skills competency is ranging from 1.13 to 4.44 with a grand mean of 2.59 and standard deviation of 0.841. This also indicated that both lecturers and technologists need communication skills competency.

Lecturers Technologists

Table 3: Mean ratings and standard deviation of motor vehicle mechanics lecturers and technologists' responses on the extent of communication skills competency needs of motor vehicle mechanics lecturers and technologists in auto fuel and air conditioning system at colleges of education

S/n	Items	Mean	Std deviation	Remarks	Mean	Std deviation	Remarks
1.	Ability to explain fluently in English language the concepts of auto fuel and air conditioning system	4.42	0.498	HN	4.44	0.512	HN
2.	Ability to comprehend theory and practical aspects of auto fuel and air conditioning system	4.08	0.846	HN	4.06	0.854	HN
3.	Ability to interpersonal communication with students, parents, fellow instructors and school administrators	1.71	1.166	LN	1.69	1.195	LN
4.	Ability of applying diplomacy in conveying sensitive information to students	1.19	0.394	VLN	1.19	0.403	VLN
5.	Ability to use contemporary modes of communication like email, interactive websites and mobile telephoning	3.27	0.962	N	3.25	1.000	N
6	Ability to maintain friendly facial expression while teaching	1.77	0.692	LN	1.75	0.683	LN
7.	Ability to guide students when doing group discussions and cooperative learning groups	3.21	1.501	N	3.19	1.559	N
8.	Ability to maintain good eye contact with students when delivery	1.38	0.789	VLN	1.38	0.806	VLN
9.	Ability to use contemporary modes of communication like email, interactive websites and mobile telephoning	3.27	0.962	N	3.25	1.000	N
10.	Ability to maintain friendly facial expression while teaching	1.77	0.692	LN	1.75	0.683	LN
11.	Ability to guide students when doing group discussions and cooperative learning groups	3.21	1.501	N	3.19	1.559	N
12.	Ability to maintain good eye contact with students when delivery	1.38	0.789	VLN	1.38	0.806	VLN
	Cluster Mean	2.60	0.849	N	2.59	0.841	N

Hypothesis 2

There is no significant difference in the mean ratings of lecturers and technologists' communication skills competency needs of motor vehicle mechanics lecturers in auto fuel and air conditioning system.

Table 4 shows that the t-value of 17.393 is statically significant at 0.05 (two-tailed) test. The null hypothesis is therefore rejected. It was concluded that there is significant difference in the mean ratings of motor vehicle mechanics lecturers and technologists in the classroom communication skills competency need of motor vehicle mechanics lecturers.

Discussion

Firstly, findings of research question 1 which is supported by testing its corresponding null hypothesis revealed that practical skills and attitude have a positive and significant of lecturer's competency needs of motor vehicle mechanics lecturers in auto fuel and air conditioning system. This is in line with the study conducted by Awang & Wahab (2026). Said that Competence refers to the knowledge, skills and attitudes or personal values needed to perform a task and responsibility in accordance with specifications and requirement. also, Nalah, (2017) revealed that lecturers possessed practical skills and attitude need competency of auto fuel and air conditioning system in Enugu, Nigeria. Similarly, the study conducted by Sadhana, (2017), revealed that evidence that exists show an interrelationship between learners' beliefs and their attitudes. The attitudes towards science practical are described as a more purposeful manner of putting together a wide range of beliefs concerning science that gives room for one to predict the way of science (Ackon, 2024).

Secondly, the findings of research question 2 and the test of its corresponding hypothesis revealed that communication skills have a positive and significant of lecturer's competency needs of motor vehicle mechanics lecturers in auto fuel and air conditioning system at colleges of education in North-Eastern Nigeria. The findings are consistent with the argument of the prior studies such as (Enyi & Egomo, (2018). Reveled that Communication involves skills which are of verbal and non-verbal forms. Verbal communication essentially depends on speech, that is, the way things that need to be said are said. This means the ability of the lecturers to adjust his/her speech to a variety in or influence the behavior of students by way of instruction or orders, persuasion and propaganda.

Conclusion

This main purpose of this research work is to assess the competencies needed by motor vehicle mechanics lecturers in auto fuel and air condition systems. The study sought to determine motor vehicle mechanics lecturers' competencies need of (practical skills and attitude, use of communication skills and evaluation techniques) in auto fuel and air conditioning system at colleges of education level in northeastern Nigeria. The study had achieved all the three objectives discussed in section 1.5.

Recommendations

The present study proved empirically that practical skills and attitude, use of communication skills have significant and positive on motor **vehicle** mechanics lecturers in auto fuel and air conditioning system at colleges of education level in northeastern Nigeria. Consequently, to reduce the attrition rate of qualified and experienced lecturers and to encourage other qualified lecturers to take teaching as a Vocation, government should give good remuneration and incentives to lecturers. This will no doubt encourage and motivate them to put more effort into their primary assignment.

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