CAPACITY BUILDING NEEDS OF AUTOMOTIVE MECHATRONICS INSTRUCTORS IN MAINTENANCE OF BRAKINGAND IGN ITION SYSTEMS IN VOCATIONAL ENTERPRISE INSTITUTIONS IN NIGERIA

By

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Abstract

The study was designed to identify the Capacity Building Needs of Automotive Mechatronics Instructors in Vocational Enterprise Institution in Nigeria, two research questions and two null hypotheses guided the study. A descriptive research design was used for the study. The study was carried out in Vocational Enterprise Institutions in FCT, Abuja and Kogi State, Nigeria. A proportional stratified random sampling technique was used to drawn 10% of automotive industrial technicians for the study. The population for the study was 115 respondents which comprises of 77 automotive industrial technicians and 38 automotive mechatronics instructors. Automotive Mechatronics Instructors Capacity Building Needs Questionnaire (AMICBNQ) developed by the researchers and validated by three experts was used for the data collected for the study. The reliability coefficient of the instrument was 0.88 through Cronbach Alpha statistics. Statistical Package for Social Science (SPSS Version 23) was used for the data analysis, weighted mean, standard deviation and improvement needed index (INI) were used for answering research questions. While z-test statistics was used to test the null hypotheses formulated for the study at .05 level of significance. The findings of the study revealed among others that automotive mechatronics instructors need capacity building in all the identified area of competencies. Based on the findings, it was recommended that: Workshop and seminars should be organized for automotive mechatronics instructors in order to build their capacity in braking and ignition systems. National Directorate of Employment (NDE) as one of the government agency charge with the responsibility of training motor vehicle mechanics should organize capacity building training from time to time and regular seminars and conferences for automotive mechatronics instructors in Vocational Enterprise Institution in Abuja and Kogi State and indeed automotive mechatronics instructors in other parts of Nigeria.

Keywords: *Vocational Enterprise Institutions, Capacity Building, Automotive Mechatronics Instructors, Braking and Ignition Systems.*

Introduction

Vocational Enterprise Institutions (VEIs) are institutions approved as part of the ongoing reform of the technical and vocational education sector. They are institutions which offer competency based-skills in vocational, technical or professional education and training at post-basic and post-secondary levels to equip the youths as well as working adults with vocational skills and knowledge to meet the increasing demand for skilled man-power in the various sectors of the nation's economy (NBTE 2007). Further, part of the objective of VEIs according to National Board for Technical Education (NBTE 2009) is to widen access to vocational education and offer credible alternative to higher education. Federal Republic of Nigeria FRN (2014) stated that, VEIs is aimed at providing appropriate skills and certification to pursue a chosen trade or career, such as fashion design, agriculture, office secretarial, carpentry and joinery, computer studies, fabrication and welding, block laying and concreting, printing technology, electrical installation and wire repair works, motor vehicle mechanics and automotive mechatronics.

Automotive mechatronics is one of the vocational trades offered in vocational enterprise institution in Nigeria which is aimed at producing competent vehicle mechanics with sound practical skills, knowledge and ability to diagnose and carryout repairs and/or maintenance on all types of modern vehicles equipped with electronics and computer systems. According to Abubakar, Yahaya and Tijani (2015) Automotive mechatronics is the synergic application of physics, namely, mechanics, fluidics (hydraulics or pneumatics), electric, electronic, overall control theory, computer science, and sensor and actuator technology to design improved automotive products and manufacturing. While, the process of developing competencies and capabilities in individuals, groups, organization is referred to as capacity building.

Capacity building is the process of developing competencies and capabilities in individuals, groups, organization sectors or countries which leads to sustainable and self-generating performance improvement in specific area or aspect of human development. Akbar (2013) defines capacity building as a process of developing and strengthening the skills, instincts, abilities, processes and resources that individuals, organizations and communities need to survive, adapt and thrive in the fast-changing world. It focuses on understanding the obstacles that inhibit people, institution, government, international organizations and non-governmental organization from realizing their developmental goals while enhancing the abilities that will allow them to achieve measurable and sustainable results. In automotive mechatronics the fundamental goal of capacity building is to enhance the ability of instructors based on perceived needs.

Capacity building needs are set of activities that expand the scale, reach, efficiency or effectiveness of an individual, organization or programme. These activities may expand services, enhance delivery of services, or generate additional resources for the individual or organization. The Canadian International Development Agency (CIDA) (2013) viewed capacity building needs as the activities, approaches, strategies, and methodologies which help organizations, groups and individuals to improve their performance, generate development benefits and achieve their objectives. Therefore, capacity building needs in the context of this study refers to strengthening the skills, competences and abilities that automotive mechatronic instructors should possessed so that they can produce competent automotive mechatronics craftsmen. Since automobile industries advance every day, automotive mechatronics instructors need consistent capacity building so as to keep in pace

with the technological advancement in the industry. Moreover, adequate knowledge and skills cannot be transfer to the trainee without an instructor.

An instructor is one who influences another to change his attitude and behavior on the basis of new knowledge, values, habit and practical skills. On the other hand, an automotive mechatronic instructor is one whose role extends from the development of intellectual activities and cognition to the development of practical skills in modern vehicles, (psychomotor), emotions, attitudes and morals (affective) (Adamu, 2015). The foregoing clearly revealed that an automotive mechatronic instructor should be familiar with the current technological changes in automotive industry, be computer literate, and plan the learning activities and experiences with the view of current global changes and practices in the technological world. However, one of the major challenges of automotive mechatronics instructors is the changes in the present-day modern vehicle systems; these changes according to Jimoh (2017) have affected automotive instructors in the areas of understanding, interpreting and maintenance of modern vehicles.

Maintenance involves taking specific approved steps and precautions to care for a piece of equipment, machinery or facility and ensure it attains its maximum shelf life. Maintenance is defined as actions necessary for retaining or restoring a piece of equipment, machine, or system to the specified operable condition to achieve its maximum useful life (Olaitan, Alaribe, & Ellah 2009). This signifies that the automotive mechatronic instructors need to know how to carry out maintenance on modern vehicle. Maintenance in the context of this study is a set of organized activities that should be carried out in order to prolong the service life of a vehicle and keep its best operational condition with minimum cost acquired. Parts of these modern vehicle system and sub systems equipped with mechatronics in the words of Malone (2016) include: Braking system and Ignition system. The vehicle system which serves to either reduces the speed of the vehicle or brought it to rest when the need arises is the braking system.

The braking system converts the mechanical energy possessed by the vehicle into heat energy by the means of friction in order to slow down the vehicle or completely stop the vehicle safely when the need arises. Giri (2013) revealed that the operation performed in braking system is the reverse of that carried out in accelerating. In the latter the heat energy of the fuel is converted into the kinetic energy of the vehicle, is converted into heat. Accordingly, the vehicle system responsible for providing spark necessary to ignite the mixture of air/fuel inside the engine cylinder is the ignition system.

The ignition system supplies a suitable spark inside the engine cylinder under all varying condition of engine operation. The spark ignites the compressed air/fuel mixture in the combustion chamber; each spark is timed to appear at the plug gap just as the piston approaches top dead centre on the compression stroke (Giri, 2013). The main component of the conventional ignition system includes; ignition coil, distribution, centrifugal advance mechanism, spark plug, switch and condenser. Gscheidle (2016) argued that most engines produced today are distributor less and rely on sensor and electronic component to perform this task.

Automobile industrial technicians in the context of this study refers to the highly skilled individual or group of individuals whose major works are to maintain vehicle functional condition by listening to operator complains, conditioning inspection, repairing engine failures, repairing mechanical and electrical system malfunctions, replacing parts and

components as well as body damage. Even though automotive instructors are involved directly in imparting practical skills aspects of modern vehicle to the trainees, they can only do so in the aspect that they can perform through the skills they possessed.

The foregoing clearly revealed that modern automobiles are blend of 20th and 21st century technology. The designs of modern vehicles have advanced to a very sophisticated level. Unlike the old mechanical operated vehicle systems, the modern vehicles are being operated and controlled by computerized electrical sensors. Indeed, almost every other function within the engine is controlled by an onboard computer. However, Hamidu (2019) pointed out that the use of electronic circuit and advents of computers have changed the operating systems in modern vehicles. Many stakeholders involved in ensuring effective integration of modern technologies in the education system, instructors have a particular important role to play. Carlson and Gadio (2012) opined that instructors are the key to whether technology is used appropriatelyand effectively. Appropriate use of modern technologies can catalyze the paradigm shift from instructors-centered pedagogy to a more effective learner-centered pedagogy; Capacity buildingof instructors can play a major role in enabling this shift. This study is therefore design to identify the capacity building needs of automotive mechatronics instructor in vocational enterprise institutions in Abuja and Kogi state.

Statement of the Problem

The responsibility of Automotive Mechatronics Instructors in Vocational Enterprise Institutions s (VEIs) in Nigeria is to facilitate learning in theoretical, practical aspect of automotive mechatronics courses and evaluate the trainees for effectiveness of training and individual growth. In addition, they should be able to conduct practical demonstration of automotive mechatronics in the workshop through the capacity building. These will enable graduates of VEIs to function effectively as a craftsmen and women in automotive establishments, carryout necessary general tests procedures, standard diagnosis and faults rectification in modern vehicles (FRN, 2014). Automotive mechatronics instructors are expected to be able to demonstrate the use of different sophisticated diagnostic equipment for fault detection and rectification in various modern vehicles brands, observe relevant safety in automotive Mechatronics Engineering practice, interpret wiring diagrams, fault codes, as well as technical reference materials (NBTE, 2009).

However, it has been observed that graduates of automotive mechatronic from VEIs who are expected to, upon completion of their training programme have acquired practical skills that will enable them to secure paid employment or set up their own workshop and become self-employed and employ others could not do so because of the limited competencies possessed by them (Hamidu, 2019). Although literatures attributed these low competencies possessed by these trainees upon graduation to low capacity building of automotive mechatronic instructors. Jimoh (2017) attributed the low capacity building in those instructors to recent advancement in automotive industry. Although these might not be unconnected with the fact that these instructors do not have up to date technical know-how and seems to lack capacity building in automotive mechatronic systems such as braking system, ignition system, transmission system, fuel supply system and suspension system. From the forgoing, this study therefore seeks to determine the capacity building needs of automotive mechatronics instructors in Vocational Enterprise Institutions in Abuja and Kogi state.

Objectives of the Study

The aim of this study was to identify the capacity building needs of automotive mechatronics instructor in vocational enterprise institutions in Abuja and Kogi state; specifically, the study sought to achieve the following objectives:

1. Determine the capacity building need of automotive mechatronics instructors in the maintenance of braking system
2. Identify the capacity building needs of automotive mechatronics instructors in maintenance of ignition system

Research Questions

The following research questions were answered in the study

1. What are the capacity building needs of automotive mechatronics instructors in maintenance of braking system?
2. What are the capacity building needs of automotive mechatronics instructors in maintenance of ignition system?

Hypotheses

The following null hypotheses guided the study and were tested at 0.05 level of significant

HO_1: There is no significant difference in the responses of the automotive industrial technicians and automotive mechatronics instructors as regard the capacity building needs of automotive mechatronics instructors in maintenance of braking system.

HO_2: There is no significant difference in the responses of the automotive industrial technicians and automotive mechatronics instructors as regard the capacity building needs of automotive mechatronics instructors in maintenance of instructors in maintenance of ignition system.

Methodology

A descriptive research design was employed for the study. The study was carried out in FCT, Abuja and Kogi State, Nigeria. A proportional stratified random sampling technique was used to drawn 10% of automotive industrial technicians for the study. Therefore, the sample population for the study was 115repondents comprises of 77 automotive industrial technicians and 38 automotive mechatronics instructors was used as the total population for the study. A structured questionnaire titled: Automotive Mechatronics Instructors Capacity Building Needs in Braking and Ignition System Questionnaire (AMICBNBIQ) developed by the researchers and validated by three experts was used for the data collected for the study. The questionnaire items were assigned four points rating scale of: Highly Needed (HN)/ Highly Performed (HP) (4), Needed (ND)/ Performed (PD) (3), Moderately Needed (MN) Moderately Performed (MP) (2), and Not Needed (NN) / Not Performed (NP) (1) The reliability coefficient of the instrument was 0.88 through Cronbach Apha statistics: Statistical Package for Social Science (SPSS Version 23) was used for the data analysis. 115 copies of questionnaire were distributed to respondents; 106 copies were duly filled by the respondents and retuned representing 91.2%. Weighted Mean and standard deviation improvement needed index were the statistical tools for answering research questions while z-test statistics was used to analyze the null hypotheses formulated for the study.

Therefore, decisions for research questions were based on the resulting mean scores interpreted relative to the concept of real lower and upper limits of numbers; that is: 3.50 – 4.00 = Highly Needed, 2.50 – 3.49 = Needed, 1.50 – 2.49 = Moderately Needed and 0.50 –

1.49 = Not Needed. Furthermore, the following steps were used to determine the capacity building needs of automotive mechatronics instructors: The weighted mean of each item under the needed category coded Xn was calculated; The weighted mean of each item under the performance category coded Xp was calculated; The performance gap (PG) was determined by finding the difference between Xn and Xp that is Xn – Xp = PG; And Where the PG is positive (+ve) it means capacity building is needed because the rate at which instructors performed is lower than expected. Where PG is negative (-ve), it means capacity building is not needed because the rate at which instructors performed is greater than the needed. And where PG is zero (0) capacity building is not needed because the rate at which instructors performed is equal to what is needed (Agboh, 2011). The decisions on the null hypotheses formulated for the study were based on comparing the significant value with (P< .05) level of significant; that is where the significant value is less than (P < .05) it was rejected, while equal or greater than (P < .05) level of significant the hypothesis was upheld and accepted.

Result

Research Question 1

What are the capacity building needs of automotive mechatronics instructors in the maintenance of braking system?

Table 1

Performance Gap Analysis of the Mean Responses of Respondents on the Capacity Building Needs of Automotive Mechatronics Instructors in Maintenance of Braking System

N=115

S/No	Items	Mean (X_n)	Mean (X_n)	PG (X_n- X_P)	
1.	Perform visual inspection of wheel speed sensor and cables	3.87	3.32	0.55	CBN
2	Identify defective wheel speed sensor	3.51	3.02	0.49	CBN
3	Check wheel speed sensor and the pulse ring	3.88	3.37	0.51	CBN
4.	Carry out speed sensor signal testing	3.91	3.27	0.64	CBN
5.	Check power supply of the wheel speed sensor	3.79	3.07	0.72	CBN
6.	Service the wheel speed sensor	3.80	3.65	0.15	CBN
7.	Visually inspect the wheel speed sensor pulsers for chipped or damaged teeth	3.88	3.37	0.51	CBN
8.	Remove wheel speed sensors	3.91	3.71	0.20	CBN
9	Replace electrical wiring to the wheel speed sensor	3.78	3.01	0.77	CBN
10.	Perform a test drive to check the wheel speed sensor after replacement	4.31	2.89	1.42	CBN
11.	Carryout visual inspection of the wiring and the mechanical components	4.04	2.45	1.59	CBN
12.	Recognize a defective Anti-lock Braking System (ABS) warning light	4.04	2.85	1.19	CBN
13.	Repair braking system for functionality	3.83	2.81	1.02	CBN
14	Test braking system after repair	3.75	2.89	0.86	CBN

15.	Carry out all kinds of mechanical tests on the braking system	4.14	2.92	1.22	CBN
16.	Check the operation of the braking system, adjust and repair according to the manufactures specification	3.55	3.45	0.10	CBN
17.	Replace faulty or bad braking system with new one	3.65	3.15	0.50	CBN
18.	Select appropriate tools and equipment for the maintenance of automotive braking system	3.90	3.65	0.25	CBN
19.	Service automatic braking system correctly	2.97	2.47	0.50	CBN
20.	Recalibrate the speed sensors	4.50	3.80	0.70	CBN
21.	Use oscilloscope to verify the voltage and signal supply to the braking system	3.65	2.50	1.15	CBN
	Grand Mean/PG	**4.04**	**3.23**	**0.74**	**CBN**

Keys: Xn = weighted mean for needed category, Xp = weighted mean for performance category, performance gap (PG) = Xn - Xp, CBN = Capacity Building Needed, CBNN = Capacity Building Not Needed

Table 1 shows the mean responses of the respondents on the twenty one (21) items posed to determine the capacity building needs of automotive mechatronics instructors in the maintenance of braking system with the grand performance gap value of 0.74. This implies that automotive mechatronics instructor's needs capacity building in all the areas of competences in the maintenance of braking system.

Research Question 2

What are the capacity building needs of automotive mechatronics instructors in maintenance of Ignition system?

Table 2

Performance Gap Analysis of the Mean Responses of Respondents on the Capacity Building Needs of Automotive Mechatronics Instructors in Maintenance of Ignition System

N=115

S/No	Items	Mean (X_n)	Mean (X_n)	PG (X_n- X_P)	
1.	Conduct engine performance test using engine analyzer and determine needed repair	3.61	3.20	0.41	CBN
2.	Test run the ignition system using the multimeter	4.31	3.15	1.16	CBN
3.	Check the crankshaft (CKP) and camshaft (CMP) sensors and their wiring for damage	4.15	2.66	1.49	CBN
4.	Record ignition timing using digital multimeter	3.51	2.91	0.60	CBN
5.	Carry out throttle cable inspection and adjustment	4.18	2.50	1.68	CBN
6.	Check the crank sensor using diagnostic tool	3.97	2.85	1.12	CBN
7.	Perform magnetic sensor testing	4.00	3.82	0.18	CBN
8.	Inspect faulty crank position sensor	3.83	3.23	0.60	CBN
9.	Test and diagnose defective reluctor sensor	3.65	3.80	0.15	CBN

10.	Use plug wire to check for spark of the plug	3.75	3.60	0.15	CBN
11.	Conduct a careful visual inspection of the wiring and the mechanical components	3.45	3.27	0.17	CBN
12.	Check the battery to make sure there is ample voltage to start the engine	3.32	3.00	0.32	CBN
13.	Inspect, repair and replace faulty electronic ignition components	3.57	2.60	0.97	CBN
14	Use engine analyzer to conduct engine performance test	3.42	2.52	0.90	CBN
15	Use diagnostic tool to check ignition problem	3.56	3.35	0.21	CBN
16	Interpret ignition diagnostics trouble codes	3.78	2.49	1.29	CBN
17	Inspect faulty electronic ignition components	4.06	3.27	0.79	CBN
18	Repair faulty electronic ignition components	3.87	3.07	0.80	CBN
19	Replace faulty electronic ignition components	4.30	2.85	1.45	CBN
20	Inspect, faulty computerized ignition components	4.18	2.50	1.68	CBN
21	Repair faulty computerized ignition components	3.76	3.27	0.49	CBN
22	Replace faulty computerized ignition components	3.74	2.49	1.25	CBN
23	Inspect faulty transistorized ignition components	3.84	3.27	0.57	CBN
24	Repair faulty transistorized ignition components	4.30	3.07	1.23	CBN
25	Replace faulty transistorized ignition components	3.75	2.85	0.90	CBN
	Grand Mean/PG	3.83	3.02	0.82	CBN

Keys: Xn = weighted mean for needed category, Xp = weighted mean for performance category, performance gap (PG) = Xn - Xp, CBN = Capacity Building Needed, CBNN = Capacity Building Not Needed

Table 2 shows the mean responses of the respondents on the twenty five (25) items posed to determine the capacity building needs of automotive mechatronics instructors in the maintenance of ignition system with the grand performance gap value of 0.82. This implies that automotive mechatronics instructors in Vocational Enterprise Institutions in Abuja and Kogi state, needs capacity building in all the areas of competences in the maintenance of ignition system.

Testing of Hypotheses

Hypothesis 1

There is no significant difference in the mean responses of the automotive industrial technicians and automotive mechatronics instructors on the capacity building needs of automotive mechatronics instructors in maintenance of braking system.

Data for testing hypothesis one are presented in table 3.

Table 3
The z-test Analysis of the Mean Responses of automotive industrial technicians and automotive mechatronics instructors on the capacity building needs of automotive mechatronics instructors in maintenance of braking system

Motor vehicle mechanics	N	Mean	S.D	df	P – value	Alpha level	Decision
Automotive industrial technicians	77	4.04	0.77	114	0.60	0.05	Upheld
Automotive mechatronics instructors	38	3.23	0.65				

Key: df = degree of freedom, p- value = probability value calculated by the computer, S.D = Standard deviation

The analysis of the results presented in table 3 revealed that p-value 0.60 is greater than 0.05 this implies that there is no significant difference in the mean responses of both groups of respondents. Therefore, the null hypothesis of no significant difference between the mean responses of automotive industrial technicians and automotive mechatronics instructors on the capacity building needs of automotive mechatronics instructors in maintenance of braking system was upheld.

Hypothesis 2
There is no significant difference in the responses of the automotive industrial technicians and automotive mechatronics instructors on the capacity building needs of automotive mechatronics instructors in maintenance of ignition system.

Data for testing hypothesis two are presented in table 4.

Table 4
The z-test Analysis of the Mean Responses of automotive industrial technicians and automotive mechatronics instructors on the capacity building needs of automotive mechatronics instructors in maintenance of ignition system

Motor vehicle mechanics	N	Mean	S.D	df	P – value	Alpha level	Decision
Automotive industrial technicians	77	3.82	0.77	114	0.96	0.05	Upheld
Automotive mechatronics instructors	38	3.02	0.65				

Key: df = degree of freedom, p- value = probability value calculated by the computer, S.D = Standard deviation

The analysis of the results presented in table 4 revealed that p-value 0.96 is greater than 0.05 this implies that there is no significant difference in the mean responses of both groups of respondents. Therefore, the null hypothesis of no significant difference between the mean responses of automotive industrial technicians and automotive mechatronics instructors on the capacity building needs of automotive mechatronics instructors in maintenance of ignition system was upheld.

Findings/Discussion

The findings in Table 1 relating to research question 1 showed that automotive mechatronics instructors in Vocational Enterprise Institutions in Abuja and Kogi State, Nigeria needs capacity building in all twenty one areas of competencies in the maintenance of braking system. The findings revealed that automotive mechatronics instructor's needs capacity building in recognizing a defective Anti-lock Braking System (ABS) warning light. This is line with the view of Erjavec (2010) who pointed out that ABS scan tools and testers can often be used to monitor and trigger input and output signals in the ABS. This will allow technicians to confirm the presence of a suspected problem with an input, switch, or output solenoid in the system. Buttressing this finding, Bosch (2013) opined that 76 percent of all new vehicles were equipped with Anti-locking Braking System and it has become standard equipment for passenger vehicle in the European Union (EU), United States of America (USA) and Japan. Affirming this assertion Ofria, (2015) reported that anti-lock braking system originally developed for aircraft braking system is now been applied in modern motor vehicles.

The findings in Table 2 relating to research question 2 showed that automotive mechatronics instructors in Vocational Enterprise Institutions in Abuja and Kogi State, Nigeria needs capacity building in all twenty-five areas of competencies in the maintenance of ignition system. The findings revealed that automotive mechatronics instructors needs capacity building in replacing faulty electronic ignition components, The finding is in line with the assertion of Melior (2015) who held that the designs of vehicles have advanced to a very sophisticated level, and unlike the old mechanically operated vehicle systems, the modern vehicles are being operated and controlled by computerized electronic sensors. For example, latest vehicles' ignition systems are electronically controlled without employing the old use of manually reset contact breaker. This finding agreed with the findings of Julian (2015) which asserted that, an ignition system is needed on gasoline engines to ignite the air-fuel mixture. It produces an extremely high voltage surge, which operates the spark plugs. A very hot electric arc jumps across the tip of each spark plug at the correct time. This causes the air- fuel mixture to burn, expand, and produce power.

The findings further revealed that automotive mechatronics instructors needs capacity building in using wire to check for spark of the plug. This finding is in consonant with the views of Melior (2015) which pointed out that, ignition system have several ignition coils, one for each spark plug or pair spark plugs, when a coil is activated by the electronic control module, high voltage is sent through a spark plug unit. Buttressing this, Bonnick (2016) revealed that without a good quality spark, in the right place at the right time the engine performance will be affected as well as the operation of emission control system.

Conclusion

This study was designed mainly to determined capacity building needs of automotive mechatronics instructors in Vocational Enterprise Institution Abuja and Kogi State, Nigeria. The findings of the study serve as the basis for making the following conclusion: that automotive mechatronics instructors needs capacity building in all the area competences in the maintenance of braking system such as perform visual inspection of wheel speed sensor and cable, check power supply of the wheel sensor, replace electrical wiring to the wheel speed sensor. It was also concluded that automotive mechatronics instructors needs capacity building in all the area competences in the maintenance of ignition system such as inspect, adjust or replace faulty crank position sensor, test and diagnose defective reluctor sensor, use plug wire to check for spark of the plug, conduct a careful visual inspection of the wiring and

the mechanical components, check the battery to make sure there is ample voltage to start the engine.

Recommendations

1. Workshop and seminars should be organized by National Automotive Council of Nigeria for automotive mechatronics instructors in order to build their capacity in braking, ignition, transmission, fuel supply and suspension system.
2. National Directorate of Employment (NDE) as one of the government agency charge with the responsibility of training in Nigeria should organize capacity building training from time to time and regular seminars and conferences for automotive mechatronics instructors in Vocational Enterprise Institution in Abuja and Kogi State and indeed automotive mechatronics instructors in other parts of Nigeria.

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