RETRAINING NEEDS OF GRADUATING MOTOR VEHICLE MECHANICS STUDENTS IN DIAGNOSIS OF MODERN VEHICLES IN MINNA METROPOLIS

BY

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DECLARATION

I **PAUL SAMUEL UCHECHUKWU,** with **Matric No**: 2016/1/63749TI, an undergraduate student of the Department of Industrial and Technology Education certify that the work embodied in this project is original and has not been submitted in part or full for any other diploma or degree of this or any other university

_____ _____

PAUL SAMUEL UCHECHUKWU Signature & Date

2016/1/63749TI

CERTIFICATION

This project has been read and approved as meeting the requirements for the award of B. Tech degree in Industrial and Technology Education, School of Science and Technology Education, Federal University of Technology, Minna.

_____ _____

Mr. ABUTU FRANCIS Sign & Date
Project Supervisor

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Dr. T. M. Saba Sign & Date
Head of Department

_____ _____

External Examiner Sign &
Date

DEDICATION

The researcher hereby dedicate this project work to his family, for their support and prayers.

ACKNOWLEDGEMENTS

I would like to express my sincere gratitude and appreciation to God almighty who contributed to the successful completion of this research project. All glory be to God.

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ABSTRACT

The research was design to investigate the Retraining Needs of Graduating Motor Vehicle Mechanics Students in Diagnosis of Modern Vehicles in Minna Metropolis. Three research question were answered and three hypotheses tested at 0.5 level of significance were formulated for the study. A survey research design was adopted for the study. The major purpose of this study is to identify the Retraining Needs of Graduating Motor Vehicle Mechanics Students in Diagnosis of Modern Vehicles in Minna Metropolis. Specifically, the study is designed to determine the:

Retraining needs of graduating motor vehicle mechanics students in the use of OBD II scan tools.

Retraining needs of graduating motor vehicle mechanics students in the use of GPS vehicle tracker.

Strategies for acquiring the retraining needs of graduating motor vehicle mechanics students in diagnostics of modern vehicles.

The literature was reviewed in line with the three research questions, and the null hypotheses were formulated to guide the study, in which several sub-headings were discussed as regard to the purpose of the study. The research design used for this study is survey research design in which questionnaire was formulated to solicit information from respondents. Data obtained was analyzed using mean, standard deviation, and t-test statistics.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Advancement in technology has made huge impact on our society by improving work output, easing stress and lessening of time taken to perform a task, provide better and faster procedures that may be employed in the production and service line among others. The automobile industry has revolutionalized the way people travel, making it faster, easier and comfortable to commute from one place to another (Briggs, 2014). The utilization of car vehicles on our streets assumes a key part in street transportation, In Nigeria where area transport is to a great extent being used contrasted with water transportation and different methods of transportation, the utilization of car vehicles, either diesel or petrol driven is prevalent. In any case, the vehicles can't stay new always, as the parts breakdown and wear out, thus must be looked after (Akinola, 2015). Technology also came along with the emergence of sophisticated and computerized diagnostic equipment in the automobile industry which now imposes great threats to roadside automobile mechanics, rendering them obsolete and redundant in their job performance owing to their inability to effectively use computerized diagnostic equipment to solve simple and complex repair jobs. These goes further to cripple job satisfaction on the part of both the roadside automobile mechanics and vehicle owners (William & Donald, 2017). Accordingly, the innovations in automobile industry are more rapid in three distinct areas namely; electronic, composite materials and non-fissile fuel forms of propulsion (hydrogen fuel), Most modern vehicles are Electronic Control Unit (ECU) enabled automobiles. ECU-enabled vehicles refer to vehicles that have ECU incorporated as a major part of the electrical system. If the ECU must be maintained, a mechanic must be ready at hand to carry

out the maintenance when called upon. Moreso, it is the responsibility of graduating motor vehicle mechanic to do that since the car owners can't go to the production factory for fault detection when it a rises. Maintenance can be characterized as an action relevant to all frameworks, common or fake, to make such frameworks stay unaltered or whole. It is the repair action completed on vehicles or different hardware to keep them unaltered, and if adjusted, to restore them to their unique state. (Akinola & Ogedengbe, 2015).

Petre *et al.* (2015) are of the opinion that a graduating motor vehicle mechanic is a person whose occupation is repairing and maintaining automobile. He also provides service assistance to motorist whose vehicles have suffered a mechanical failure that is significant enough to leave them stranded at their present location. A graduating motor vehicle mechanic is a technician with an assortment of car makes or either in a particular territory or in a particular make of car. In repairing autos, their primary part is to analyze the issue precisely and rapidly. They regularly need to quote costs for their clients before starting work or after halfway dis-get together for investigation. Their employment may include the repair of a particular part or the substitution of one or more parts as gatherings. Essential vehicle upkeep is a basic piece of a mechanics working advanced industrialized nations, while in others they are just counseled when a vehicle is as of now hinting at breakdown. Precaution upkeep is additionally a major some portion of a technician's occupation, yet this is unrealistic on account of vehicles that are not frequently kept up by a mechanic (Oladokun, 2017).

Historically, roadside motor vehicle mechanics came into existence through apprenticeship training programmes and the training being received are inadequate, reasons being that they lack the theoretical content. In this type of training, the apprentice is told what to do without the reason why it is being done. Their creativity and innovation are not developed. They are unable to cope

with challenges from computerized cars or vehicles, they cannot perform properly. Thus the impact of recent technology poses challenges to the job performance and satisfaction of motor vehicle mechanics (Okoro, 2016).

The motor vehicle mechanics of today must be able to do well and be specifically trained and equipped for an on-board diagnostic technology, if at all they want to remain in the profession (Malone, 2016). For the motor vehicle mechanics of today to effectively service and repair modern cars, they must have undergone training and experience in a diverse range of subject, which includes mechanical engineering, electrical engineering, electronics, chemistry, physics and many more. Allen (2016) stated that, motor vehicle mechanics must be knowledgeable in mechanical, electrical and computer technology and their knowledge in these areas must be updated to keep up with the rapid changes in modern automobile vehicles. In essence, they must have a well- rounded education that will adequately prepare them to repair contemporary automobiles, as well as adapt to future changes in the industry. They must understand not only the parts, nomenclature and operation, but also understand the diagnostic and service procedure for each system in the vehicle. The high technological nature of today's vehicles mandates the need for regular training of the motor vehicle mechanics. As such Nigerian motor vehicle mechanics craftmen needs to be retrained to enable them cope with high level of technological advancement particularly in the field of automobile technology.

Okwelle (2014) perceived that it is exceptionally important for graduating motor vehicle mechanic to be taught on the utilization of different car devices. The information on the utilization of On-Board Diagnostic (OBD) device, sweep instrument, Global Positioning System (GPS) vehicle tracker and other car devices will offer assistance. On-board diagnostics (OBD) is a car term alluding to a vehicle's self-analytic and reporting ability. OBD frameworks give the vehicle

proprietor or repair professional access to the status of the different vehicle subsystems. The measure of analytic data accessible by means of OBD has differed broadly since its presentation in the mid 1980s renditions of on-board vehicle PCs. Early forms of OBD would just enlighten a breakdown marker light if an issue was recognized yet would not give any data as to the way of the issue. Present day OBD executions utilize an institutionalized advanced interchanges port to give ongoing information notwithstanding an institutionalized arrangement of demonstrative inconvenience codes, or DTCs, which permit one to quickly distinguish and cure glitches inside of the vehicle.

A GPS following unit is a device, ordinarily conveyed by a moving vehicle or individual, that uses the Global Positioning System to decide and track its exact area, and consequently that of its transporter, at interims. The recorded area information can be put away inside of the following unit, or it might be transmitted to a focal area information base, or Internet-joined PC, utilizing a cell (GPRS) or satellite modem installed in the unit. This permits the apply area to be shown against a guide scenery either progressively or while examining the track later, utilizing GPS following programming. A GPS tracker basically contains a GPS module to get the GPS flag and compute the directions.

A car output device (scanner) is an electronic instrument used to interface with, analyze and, once in a while, reinvent vehicle control modules. The sweep apparatus is associated with the vehicle's information join connector (DLC) and, contingent upon the specific device, might just read out analytic inconvenience codes. Real sweep instruments will show live information stream (inputs and yields), have bi-directional controls (the capacity to make the controllers do things outside of typical operations) and may even have the capacity to adjust/program modules inside of specific

parameters. On the other hand, a common sweep apparatus does not be able to completely reinvent modules (Wentz, 2017).

Also it will help them to understand the principle behind the functioning of electronic computerized unit. Electronic Control Unit (ECU) is a computerized micro system that is programmed to centrally control all the sensors and the actuators (fuel injectors) to get the desired performance in a modem vehicle (Coombes & Rogers, 2013). Hillier et all explained further the complexity of electronically controlled vehicle systems easily posse confusion to roadside automobile mechanics and they refer to ECU as brain box, William and Donald (2017) are of the opinion that the increase use of electronics components, equipment and electronic devices in the automobile industry is threatening the job performance of roadside automobile mechanics. The task of graduating motor vehicle mechanic involves inspection, maintenance and repairs of cars and light trucks (Kirpal, 2016).

He further stated that graduating motor vehicle mechanic performs routine service on vehicles and light trucks to keep them running properly such as testing, inspection and lubrication of engines and component parts of the vehicle, They often follow a checklist to be sure they examine potential trouble spots. They install or repair belts, hoses, plugs, brakes, fuel system and accessories such as heater and windshield wipers. Salami (2017) opines that recent technology in the automobile industry makes use of more advanced electronics, computers and wireless communication system to assist drivers and enhance safety.

Graduated motor vehicle mechanics needs retraining on how to use various diagnostic instrument or devices such as code reader, diagnostic scan tool, digital laser thermometer temperature gun, battery tester, pneumatic wrenches, infrared engine analyzer. Others may include computerized air conditioning equipment, brake tester and so on. Therefore based on this insight the study assessed

the retraining needs of graduating motor vehicle mechanics students in diagnostics of modern vehicle in Minna Metropolis

1.2 Statement of the Problem

Graduating motor vehicle mechanics students in Nigeria have been finding it quite challenging in meeting up with new developments in automobile vehicles. Jalal, (2019), stressed that majority of Nigerian roadside mechanics may be rendered unemployed as a result of the influx of new vehicles into the country. He further explained that it is because these types of vehicles the mechanics that are trained to fix vehicles in Nigeria are getting out of job. The wide range of fanciful vehicles imported into the country by individuals, firms and various government organizations, most mechanics are not conversant with them in terms of maintenance and repairs. In a country, where mechanics are illiterates or semi illiterates, the high sophisticated combination of mechanical and electrical parts put them at a disadvantage. Their knowledge of most new system in modern vehicles is generally low, while their inability to read and interpret electronics circuit diagrams is also a big problem. Jalal (2019), also added that our mechanics cannot repair many of the vehicles plying the Nigerian roads today.

The continuous use of sophisticated electronics equipment and devices has changed the work skills and competence requirements of graduating motor vehicle mechanics. This shift has made many graduating motor vehicle mechanics redundant due to lack of competency in the use of modern automobile diagnosis devices such as OBD, GPS vehicle tracker and scan tools. This has led to poor job performance and low satisfaction among auto-technicians and car owners. This therefore calls for the retraining need of these graduating MVM students in order to improve job performance.

1.3 Purpose of the Study

The purpose of the study is on the retraining needs of graduating motor vehicle mechanics students in diagnostics of modern vehicle in Minna metropolis. The specific objectives of the study are to determine:

1. The retraining needs of graduating motor vehicle mechanics students in the use of OBD II scan tools.
2. The retraining needs of graduating motor vehicle mechanics students in the use of GPS vehicle tracker.
3. Strategies for acquiring the retraining needs of graduating motor vehicle mechanics students in diagnostics of modern vehicles.

1.4 Research Questions

The following research questions were formulated to guide this study:

1 What are the retraining needs of graduating motor vehicle mechanics students in the use of OBD scan tools?

2 What are the retraining needs of graduating motor vehicle mechanics students in the use of GPS vehicle tracker?

3 What are the strategies for acquiring the retraining needs of graduating motor vehicle mechanics students in diagnostics of modern vehicles?

1.5 Significance of the Study

The findings of this study would be of immense benefit to Craftmen, MVMW graduates, Automobile teachers, National Board for Technical Education, Automobile Industries, Government, Federal Ministry of Education, parent and society

Craftmen (road side mechanics) who are products of the informal automobile sector or apprenticeship programme will benefit from the findings of this study by becoming more enlightened on the automobile technologies and strive towards updating their knowledge and skills in line with the identified technology skills. This will enable them to keep pace with technological improvements for performing optimally and remain relevant in the modern automobile industry.

The automobile technology diagnostic skills identified in this study when integrated into the curriculum could help the students of MVMW to acquire new set of skills required for diagnostics of modern vehicles. Students will also be exposed to new body of knowledge/content on modern cars so as to enhance their understanding of their working principles and how to handle complex fault in them.

The acquisition of technology skills identified in this study will enable MVMW graduates to become self reliant, self-employed and employers of labour. The findings will also enable MVMW graduates to acquire new competencies for diagnostic, servicing and repair of modern vehicles in order to remain relevant in the automobile industry.

Automobile teachers will benefit from the findings of this study by identifying areas of automobile technology where students are deficient and on which they may need to update their technical competence in the area of diagnosing and also be productive in paid or self-employment. Teachers through the findings of this study will also identify outdated technologies in curriculum content that should be given less emphasis while the new technologies will be given adequate recognition in the training of MVMW students. MVMW teachers will equally use the findings of the study to master these new technology skills as a means of enhancement towards productivity and adaptability. Hence, updating their skills will remain paramount with constant advancement in frequent changes in automobile technology. This will be attainable when automobile teachers attend planned retraining and improvement programmes that takes practical and new skills in automobile technology into cognizance.

The National Board for Technical Education which is solely responsible for planning and reviewing the technical college curriculum will through the findings of this study become aware of diagnostic skills required by MVMW graduates in the maintenance of modern vehicles. National Board for Technical Education could use these identified skills to update the pedagogy and components of the curriculum for MVMW in technical colleges. This could make the curriculum more activity centered thereby stimulating the interest and motivation of students towards the automobile trade.

Automobile servicing companies will equally find the result of this study very beneficial when incorporated into the curriculum content of MVMW in tertiary institution as it will produce a pool of highly skilled automobile graduates (craftsmen) who will be versatile and adaptable to the dynamic nature of modern vehicles, thereby enhancing the performance and productivity of the automobile industry towards the sustenance of Nigeria's economic and industrial growth.

The findings of this study will sensitize the government on the performance gap between technical skills acquired by graduates of MVMW and the requirements of modern automobile industries. Hence, the government will be encouraged to organize retraining programmes and skill improvement workshops for instructors of MVMW whose responsibility it is to impart technical skills on students for gainful employment upon graduation.

The findings of the study would also be of benefit to formal and non formal vocational training organs, and other skill acquisition and enhancement programme sectors like the National Directorate of Employment (NDE). The formal vocational training organs like the technical colleges, relevant technology training centres, monotechnics, Polytechnics, Colleges of Education (Technical) will benefit if these skills are identified and included in their training programmes or curriculum. The curriculum will be used in the training to equip the students with adequate skills to handle and maintain modern motor vehicles. The non formal vocational education like the apprenticeship system and the NDE could benefit by improving their skills in line with the identified skills with respect to the innovations in modern motor vehicles.

The findings from the study would be used by the Federal Ministry of Education as a guide on the type of directive required to be given to skill acquisition centres, administrators for the training of the unemployed youths for jobs in motor vehicle mechanics enterprises. The findings would also be useful to the ministry as a reference material during courses for teachers of automobile mechanics by officials of the ministry.

The findings of the study would be useful to parents and the society in general because it will serve as a reference material to parents whose wards have the zeal and desire of becoming Auto-mechanics, Auto-technicians or Auto-engineers right from their junior or senior secondary schools

on how to guide and encourage their wards towards attainment of those skills. The society stands to benefit from the skills and services rendered by motor vehicle mechanic graduates.

1.6 Scope of the Study

The study covers the retraining needs of graduating motor vehicle mechanic in the use of modern automobile diagnostic devices such as OBD II scan tools, GPS vehicle tracker and scan tools. The study will cover Minna metropolis. The duration of the study will be within eight (8) weeks. The study will not be carried out in Mokwa and Bida metropolis due to shortage of automobile workshop availability

1.7 Hypotheses

The following null hypotheses were formulated and will be tested at 0.05 level of significance:

HO_1: There is no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of OBD scan tools in Minna Metropolis

HO_2: There is no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of of GPS vehicle tracker devices in Minna Metropolis.

HO_3: There is no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles

CHAPTER TWO

2.0 LITERATURE REVIEW

The related literature will be review under the following sub-headings;

2.1 Conceptual Framework of the Study

2.1.1 Motor vehicle mechanics in technical colleges

2.1.2 Fault in modern vehicle

2.1.3 Training needs of automobile craftmen on modern vehicle diagnosis

2.1.4 Retraining needs of graduating motor vehicle mechanic students in the use of OBD II Scan tools

2.1.5 Retraining needs of graduating motor vehicle mechanic students in the use of GPS vehicle tracker

2.1.6 Strategies for acquiring the retraining needs of graduating motor vehicle mechanic students

2.2 Theoretical Framework

2.2.1 Dreyfus Model of Skill Acquisition

2.2.2 The Schumpter Effect

2.3 Related Empirical Studies

2.4 Summary of Related Literature

2.1 Conceptual Framework of the Study

2.1.1 Motor vehicle mechanics in technical colleges

Motor Vehicle Mechanic's Work (MVMW) is a vocational trade that prepares individuals for the world of work. It is one of the automobile trades offered in technical colleges in Nigeria (NBTE, 2011). MVMW in technical colleges is aimed at producing competent vehicle mechanics with sound theoretical knowledge and should be able to diagnose and carryout repairs and/or maintenance on all types of Diesel and Petrol Vehicles (National Board for Technical Education, 2001). In other words, the programme for MVMW in Nigerian technical colleges is designed to produce competent maintenance craftsmen for all types of motor vehicle. These craftsmen may also wish to take the opportunity for further technical education. (NBTE, 2011).

A national curriculum according to Okoro (2013) was adopted in all technical colleges and accredited by the National Board for Technical Education (NBTE). The programme is offered at two levels leading to the award of National Technical Certificate (NTC) for craftsmen and Advanced National Technical Certificate (ANTC) for Master craftsmen. According to Federal Government of Nigeria (2014), technical college graduates on completion of the Motor Vehicle Mechanic's Work in the technical college shall:

- Secure employment either at the end of the whole course or after completing one or more modules of employable skills;
- Set up their own business and become self-employed and be able to employ others.

- Pursue further education in advanced craft/technical institutions such as polytechnics, or colleges of Education (Technical) and Universities.

In pursuance of the aims and goals of technical colleges, Federal Government of Nigeria (2004) pointed out in the National Policy on Education that the main feature of the curricular activities for technical colleges shall be structured in foundation and trade modules. In line with the policy statement, the revised National Technical Certificate (NTC) and revised Advanced National Technical Certificate (ANTC) programmes, curriculum and course specifications were published in 2001 for Motor Vehicle Mechanic's Work and other vocational courses in the Technical Colleges by National Board for Technical Education (NBTE). It was sponsored by United Nations Educational Scientific and Cultural Organization-Nigeria project in support of the Revitalization of Technical and Vocational Education in Nigeria. The goal of service station mechanics is to produce a fore court service mechanics with a thorough knowledge of routine service and ability to carry out fore-court servicing and sales (NBTE, 2011).

General Objectives: On completion of this module, trainees should be able to:

- Understand the layout and function of the principal components of the motor vehicles.
- Understand the sealing and locking method, seal and lock motor vehicle components/parts efficiently.
- Understand the basic services involved and carryout routine maintenance on different types of motor vehicles.
- Understand the basic construction of a battery
- Understand the basic principle of the motor vehicle and carryout general maintenance work on them.

- Maintain types in good working condition and carryout wheel alignment
- Understand the combustion process in spark and compression ignition engines.
- Understand service station operation procedures.
- Understand the properties of fuel and oils.
- Understand the safety precaution relating to the handling and storage of fuel and oil. (NBTE, 2011).

Motor Vehicle Mechanic's Work is an occupation that has been affected by the changes in technology and industrial standards. The current trend, innovations and the emerging technology in automobiles is a challenge to fault diagnosis, maintenance and repairs. This advanced and continuously evolving technology will require students of MVMW in the technical colleges to acquire sufficient knowledge and skills in the areas of both maintenance and repair, since individual student of MVMW need advanced knowledge to deal with the changes brought about by latest technology in the automobile industry. Hence, as new development arises, the vehicle system becomes more complex.

2.1.2 Fault in modern vehicle

The diagnosis of modern vehicle is crucial in which the engine is the power plant of a vehicle. Engine system provides the energy to propel (move) the vehicle and operate the other systems. Most engines consume gasoline or diesel fuel. The fuel burns in the engine to produce heat. This heat causes gas expansion, creating pressure inside the engine. The pressure moves internal engine parts to produce power. The engine is usually located in the front portion of the body. Placing the

heavy engine in this position makes the vehicle safer in the event of a head-on collision. In a few vehicles, the engine is mounted in the rear to improve handling (Wilcox, 2013).

Vehicle have gone through tremendous changes since the automobile was first introduced in the 1880s, but all combustion engines still have three requirements that must be met to do their job of providing power – air, fuel, and ignition. The mixture of air and fuel must be compressed inside the engine in order to make it highly combustible and get the most out of the energy contained in the fuel mixture. Since the mixture is ignited within the engine, automobile power plants are called internal combustion engines (Melior, 2015). Erjavec (2010) stated that while trying to produce more fuel-efficient vehicles, manufacturers replaced large eight-cylinder engines with four-cylinder and other small engines. Today's engine control systems are On-Board Diagnostic (OBD II) second-generation systems. These systems were developed to ensure proper emission control system operation for the vehicle's lifetime by monitoring emission-related components and systems for deterioration and malfunction. In addition, by the mid-1980s, all automobiles were equipped with some type of electronic control system; basic engine systems like carburetors and ignition breaker points were replaced by electronic fuel injection and electronic ignition systems. These systems monitor the engine's operation and provide increased power outputs while minimizing fuel consumption and emissions. According to Stephen *et al.* (2016), computers and electronic devices are used to control the operation of an engine. Because of these controls, today's automobiles use less fuel, perform better, and run cleaner than those in the past. Computerized engine control systems control air and fuel delivery, ignition timing, emission systems operation, and a host of other related operations. The result is a clean-burning, fuel-efficient, and powerful engine (Erjavec, 2010).

Engine control system according to Alfredas (2017) uses an Electronic Control Unit (ECU) with a built-in microprocessor. Stored inside the ECU is the data for fuel injection duration, ignition timing, idle speed, etc., which are matched with the various engine conditions as well as programs for calculation. The ECU utilizes these data and signals from the various sensors in the vehicle and makes calculations with the stored programs to determine fuel injection duration, ignition timing, idle speed, etc., and outputs control signals to the respective actuators which control operation . This allows the car to adapt to environmental conditions such as air density in order to increase the combustion efficiently subsequently improving fuel economy. All decisions made by the ECU are based on the state of sensors that are placed at various places throughout the vehicle primarily around the engine bay. In other words, electronic sensors are used to monitor the engine and many other systems.

Vineet (2014) stated that due to the regulations demanding lower emissions, together with the need for better performance, fuel economy, continuous diagnosis electronic systems form an inevitable part of engine management. Electronic Engine Management according to Vineet (2004) is the science of electronically equipping, controlling and calibrating an engine to maintain top performance and fuel economy while achieving cleanest possible exhaust stream, and continuously diagnosing system faults. Furthermore, Vineet stated that the engine management ECU would perform the following functions.

- Sense ignition on (input -pin18), then turn on the main relay (output -pin 4), acknowledgement received at (input -pin23).
- Turn on the pump relay (output -pin 16)
- Turn on the sensors (output -pin 12)

- Fire ignition at appropriate time (output -pin 13)
- Send supply voltage to Throttle sensor (output -pin9)
- Sense air flow meter voltage (input -pin 21)
- Sense throttle voltage (input -pin 22)
- Sense temperature sensor voltage (input -pin 10)
- Adjust idle speed by sending pulses to stepper motor of idle adjuster (output –pins 14, 2, 15, 3)
- Turn on fuel injectors at appropriate time (output - pin 1).

2.1.3 Training needs of automobile craftmen on modern vehicle diagnosis

Kirpal (2016) stated that the task of automobile craftmen involves diagnosis, maintenance and repair of cars and light trucks. He further stated that Automobile craftmen Automobile craftmen performs routine services on vehicles and light trucks such as testing, inspection and lubrication of engines and component parts of the vehicle to keep them running well. They regularly take after an agenda to make sure they look at potential inconvenience spots. Belts, hoses, attachments brake and fuel frameworks are things mechanics may introduce or repair adornments, for example, radiators and windshield wipers.

Khurmi and Gupta, (2017) expressed that after a basic examination is did on a vehicle, the Automobile craftmen Automobile Mechanic more often than not give definite clarifications to Vehicle Owners on the side effects and conceivable vehicle deficiencies. They further expressed that for any automobile craftmen to adapt up to the quick moving pattern of innovation on vehicles, they must gain those execution aptitudes in capably taking care of different electronic

demonstrative gear for the determination and repair of present day cars. They utilize assortment of testing hardware, for example, hand held analytic PCs and pressure gages. The applicable changes and repairs are then made to restore the vehicle back to sound execution. In some cases, they supplant or reconstruct frameworks that are severely harmed. They likewise uncovered that most Automobile craftmen are bereft of the basics of the hypothetical operational standards of car innovation. Hillier et al (1991) revealed that Automobile craftmen certainly have the ability to acquire electronic indicative hardware, yet they do not have the specialized aptitudes for its application. He additionally included that for extensive repairs, Automobile craftmen evaluate the expense and get the clients endorsement before doing any Work. Vehicle Owners when fulfilled by repair work done by Automobile craftmen, pay standard cost – a great entirety of cash. Typically some Automobile craftmen have institutionalized charges for administrations rendered. He likewise noticed that for a decent and intensive employment performed by Automobile craftmen, clients – vehicle Owners ought to figure out how to say "thank you" as an indication of appreciation and gratefulness which cost nothing paying little respect to the way that the Vehicle Owner is really paying for the administrations rendered.

They further stated that Automobile craftmen who work in substantial shops may spend significant time in one or more zones. For instance, programmed transmission experts chip away at apparatus trains, pressure driven pumps and different jeans of a transmission. Tune up experts conform timing and valves, change or supplant sparkle fittings and different parts. Front end mechanics adjust and adjust wheels, repair directing and suspension frameworks. Brake repairers conform brakes, supplant harm brake linings and cushion. In little shops, mechanics must think about all territories of auto repair to make the most of his occupation.

It has been uncovered that today's Automobile craftmen utilize an assortment of instruments in their work. They utilize force devices, for example, pneumatic wrenches to evacuate jolts rapidly. They utilize machine devices, for example, machines and pounding machines to reconstruct brakes. They utilize welding and fire slicing gear to evacuate and repair depletes frameworks and in addition jacks and derrick to lift autos and motors. Likewise, mechanics use normal hand instruments, for example, spanners, screw drivers and forceps to chip away at little parts. A few mechanics use electronic part like infra-red motor analyzers and mechanized demonstrative gadgets. These gadgets analyze issues and make exact modification. Other modem gear utilized as a part of vehicles workshops are

i. Computerized aerating and cooling gear

ii. Computerized brake analyzer

iii. Computerized compacted air gear

iv. Computerized discharge and indicative hardware

v. Computerized jacking gear

vi. Computerized grease hardware

vii. Computerized tire and wheel administration gear

viii. Computerized wheel arrangement

2.1.4 Retraining needs of graduating motor vehicle mechanic students in the use of OBD II Scan tools

In the early seventies, the United States Environmental Protection Agency (EPA) introduced a new policy which mandated the use of On-Board Diagnostics (OBD) for vehicles in the United States

of America. Similar requirements were also introduced by the California Air Resources Board (CARB). This led to the development of new technologies that allowed automotive service technicians to monitor almost all aspects of the vehicle performance on instruments hooked up to data ports on cars (William, 2011). OBD 11 replaced OBD 1 in the mid-nineties with more sophisticated monitoring systems and OBD 111 is on the horizon (Don, 2018). According to Malone (2016), cars were equipped with first generation on-board diagnostic (OBD-1) systems from 1986-1995 and further equipped with second generation OBD-2 systems from 1996 till date. In addition, sophisticated computer technology, advanced wiring, intricate circuitry and complex engineering are now in use. OBD is a set of self-testing and diagnostic instructions programmed into the vehicles on- board computer. The programs are specifically designed to detect failures in the sensors, actuators, switches and wiring of various vehicle emission-related systems. If the computer detects a failure in any of these components or systems, it illuminates an indicator on the dashboard to alert the driver. The indicator illuminates only when an emission-related problem is detected (Smith, 2006).

The objective of OBD II is to reduce the time between occurrence of a malfunction and its detection and repair (Burelle, 2004). Consequently, the illumination of a Malfunction Indicator Light (MIL) on a vehicle's dashboard is intended to alert both vehicle owners and repair technicians that there is something wrong with the vehicle and that troubleshooting, repair or servicing is required. When the OBD system determines that a problem exists, a corresponding “Diagnostic Trouble Code (DTC)” is stored in the computer’s memory. The computer also illuminates a yellow dashboard light indicating “Check Engine” or “Service Engine Soon” or displays an engine symbol (William, 2011). This light informs the driver of the need for service, not of the need to stop the vehicle. A blinking or flashing dashboard lamp indicates a

rather severe level of engine misfire. When this occurs, the driver should reduce engine speed and load and have the vehicle serviced as soon as possible. After the problem has been fixed, the dashboard lamp will be turned off. In addition, when a problem that could cause a substantial increase in air emissions is detected, the OBD II system turns on a dashboard warning light, the Malfunction Indicator Light (MIL), to alert the driver of the need to have the vehicle checked by a repair technician. A repair technician can then ascertain the status of various vehicle systems by connecting a scan tool to the standardized connector, the Diagnostic or Data Link Connector (DLC).

Modern vehicles are getting cleaner due to newer technology and emission control components, but the emissions are only low when all the systems are in proper working order (William, 2011). When an engine is not running as efficiently as possible, performance is lost, fuel is wasted, and air emissions increase. OBD can detect problems that may not be noticeable upon visual inspection. By detecting emission control component deterioration and/or failures, and alerting the driver to the need for potential repair, vehicles can be properly serviced before more serious and expensive problems develop. Early diagnosis followed by timely repair can often prevent more costly repairs to either electronic or mechanical components. For example, a poorly performing spark plug can cause the engine to misfire, a condition sometimes unnoticed by the driver. The engine misfire can, in turn, quickly degrade the performance of the catalytic converter. With early OBD detection of the engine misfire, the driver would be faced with a relatively inexpensive spark plug repair. Without OBD detection, over time the driver could be faced with an expensive catalytic converter repair in addition to the spark plug repair. There are also situations under which the vehicle's OBD system can turn off the dashboard light automatically if the conditions that caused a problem are no longer present. If the OBD system evaluates a component or system three

consecutive times and no longer detects the initial problem, the dashboard light will turn off automatically.

A modern OBD II system is capable of monitoring a number of sensors to determine whether they are working as intended. It can detect a malfunction or deterioration of various sensors and actuators, usually well before the driver becomes aware of the problem. These sensors and actuators, along with the diagnostic software in the on-board computer comprise the On-Board Diagnostics (OBD) system (Burelle, 2014). Bonnick (2011) included on-board diagnostic tool in the system because the information in the software needs to be read by the tool to appreciate the utility of the system.

2.1.5 Retraining needs of graduating motor vehicle mechanic students in the use of GPS vehicle tracker

Today's cars depend upon gadgets and PCs to control and screen all parts of vehicle operation, for example, speed, motor upheaval every moment (RPM), coolant temperature, and oxygen sensor. William and Donald (2016) uncover that, modem vehicles contains various on board PC chips which work in a joint effort with the car electronic control unit (ECU) to screen and control numerous frameworks, for example, the motor, transmission, airbags among others. The electronic control unit (ECU) is a car framework PC that gets data or signs from sensors and is modified to halfway work different frameworks taking into account the data got. Sensors are data gadgets that change over physical conditions into electrical flags and send it to the ECU, while the actuator is a yield gadget that changes over electrical signs from the ECU into mechanical movement (Salami, 2004). While driving, if the vehicle's ready PC framework distinguishes an issue, the driver is educated utilizing the "check motor" or "administration motor soon" light on the vehicle dash board. This light is otherwise called the breakdown marker light (MIL). At the point when this

light enlightens, an analytic inconvenience code is spared into the PC memory, prepared for a sweep device to peruse the quality and analyze properly (Khurrni and LoGupta, 2014).

A Global Positioning System (GPS) taking after unit is a gadget, customarily passed on by a moving vehicle or person, that uses the Global Positioning System to choose and track its careful territory, and thusly that of its conveyor, at between times. The recorded range data can be secured within the accompanying unit, or it may be transmitted to a central region data base, or Internet-joined PC, using a cell (GPRS) or satellite modem embedded in the unit. This grants the apply territory to be appeared against an aide foundation either continuously or while analyzing the track later, using GPS taking after programming. A GPS tracker essentially contains a GPS module to get the GPS banner and figure the headings.

2.1.6 Strategies for acquiring the retraining needs of graduating motor vehicle mechanic students

Retraining is defined as upgrading of existing skills or acquiring a new one. The students of MVM program in the schools should be trained practically to improve their performance and knowledge especially to make the students acquire the needed skills during teaching and learning session. The training and retraining of MVM students in the technical colleges is as vital as training of the industrial worker. The training should be a continuous process. Training is not something that is done to new employees only, but is used continuously in every well-ran organization. The training and retraining therefore, involves the acquisition of special skills and evidence of learning is manifested through the successful performance of these skills acquired. Students of MVM program in the technical colleges must therefore keep abreast with the new technological development and must keep on learning and acquiring new skills in order to be able to demonstrate

knowledge and new skills to their students. Their training should not be confined to the class work or workshops alone, but engaged in conducting intensive research on local technologies.

The Technical Vocational Education (TVE) institutions especially technical colleges must provide its workers with the quickest possible methods at its disposal to be able to function effectively on the job. The training and retraining of teachers should provide them with skills and change of attitude to work, thereby improving their efficiency and productivity. Haruna (2016) defined training and retraining as those activities which are designed to improve performance on the job, the employee is presently doing or being hired to do. Training can also be visualized as the acquisition of knowledge, skills techniques, attitudes and experiences which enable an individual to make effective contribution to the combined effort of a team in the service delivery. The need for basic knowledge and skills needed for the roles the teachers would play in the teaching learning process is of vital concerned of the technical college, if the technical institution is to survive. Training and retraining prepares the employee or individual worker such as MVM graduating students to fit in, in the specific role they are expected to play. Training is the process of imparting specific skills which will equip the individual or group of people to perform specific jobs effectively, efficiently and diligently for effective and efficient training programs, training facilities must be provided for both the trainees. Training and retraining programs should expose the MVM teachers to the necessary facilities they have to work with in their fields. All institutions involved in the training of teachers should be adequately equipped. Technology education institutions have to be well equipped with gadgets, resources and materials essential for use in the classrooms and workshops.

The ever changing role of the students, demands professional MVM teachers not only in name but also in training and status in the society. Goro (2019) stated that students must be provided with

and have access to the necessary technological equipment training and resources that will result in enriched their learning. The MVM graduating student in training therefore, need quite a good number of infrastructure and educational facilities like machines, tools, equipment and books. MVM students need to be provided with good recreational facilities for their physical mental and social developmental growth. The Federal Republic of Nigeria (FRN, 2004) acknowledges that no education system can be better than the teachers who operate it. So to get good quality technology education MVM graduating students, must be well trained to be able to impart same to the society.

2.2 Theoretical Framework

Theories are postulates requiring further explanations in order to make meaning. According to Jamabo & Kinanee (2004), theories can be described as a set of concepts, principles, propositions and generalizations that are logically interconnected which present a systematic view of phenomena that enable the user to describe, explain, predict or advance knowledge. Theories are thus the foundation of any research (Olaitan, Ali, Eyo & Sowande,2000). In other words, theories are principles on which a subject of study is based. When a theory is applied in teaching and learning, it provides the principles, which directly governs it (Nwachukwu, 2001). Continuing, Nwachukwu stated that for a theory to be useful, it should play two important roles such as:

- It should serve as a process of systematizing information in an area of knowledge thereby leading to the discovery of unknown facts; and

It should summarize information in such a manner that is easily used to explain a given concept.

Therefore, the theoretical foundations upon which this study is based are Dreyfus model of skill acquisition, Dynamic skill theory and Psychological theories of the Refugee and Schumpter effects.

2.2.1 Dreyfus Model of Skill Acquisition

Stuart and Hubert Dreyfus (1980) propounded the "Dreyfus model of skill acquisition" which states that formal system of education is a gradual process that involves being embodied in different ways and developing skills that would make it possible for people to deal with the world. The main idea behind the Dreyfus's model of skill acquisition is the distinction they make between "knowing that" and "knowing how". The two concepts are considered as one concept, which is acquired through a formal system of education. According to Stuart and Hubert Dreyfus (1980), learners acquire skills through instruction and experiences, they do not appear to leap suddenly from rule-guided "knowing that" to experienced based knowing-how. The Dreyfus model of skill acquisition is a model of how students acquire skills through formal instruction and practicing. They believe that there is a gradual process involved for a learner to go through in order to reach the stage of expertise or knowing-how.

The original model proposes that a student passes through five distinct stages: novice, competence, proficiency, expertise, and mastery. However, these stages of skill acquisition relates to this study in the following ways:

- Novice Stage: At this first stage, a person follows rules as given, without context, with no sense of responsibility beyond following the rules exactly. In the process of learning the rules, students upon graduation are already exposed to the basic knowledge and principles of skill acquisition in order to prepare him for emerging technology skills for the maintenance of modern vehicles.

- Advanced Beginner: The learner at this stage recognizes new situations in which the rules may be applied. Student's performance improves to a relatively acceptable level only after the

novice has had enough experience in copying the real situation, the students starts to show unique performance through personal experience.

- Competency Stage: Competence develops when the individual develops organizing principles to quickly access the particular rules that are relevant to the specific task at hand; hence, competence is characterized by active decision making in choosing a course of action. Student's at this stage begins to get involved personally with the task. They start seeing more than one option from which they have to choose the best one for optimal performance.

- Proficiency Stage: Proficiency is shown by individuals who develop intuition to guide their decisions and devise their own rules to formulate plans. The progression is thus from rigid adherence to rules to an intuitive mode of reasoning based on tacit knowledge. This is the stage where the student while intuitively understanding his task, still thinks analytically about his actions. The student must have acquired basic skills that will enable him think creatively towards becoming self employed after graduation. Hence, analyzing ways of raising capital, location of business and other business strategies becomes his priority.

- Mastery Stage: Experts in general know what to do base on mature understanding of the task. An expert has had so much experience with the task that the skill of carrying out the task is part of him. He acts upon correct intuitions without analytically thinking about his every move. They also emphasize on the fact that practice is required for the agent to maintain the knowing-how. Without practice, the agent will gradually lose his expertise and s most likely to regress as far as the competence stage. This is the level to which the ability to create jobs which will in turn make a MVMW graduate self employed becomes necessary.

2.2.2 The Schumpter Effect

The process of entrepreneurship activity reducing unemployment situation in the economy is termed "Schumpter effect". The main idea behind the Schumpter effect is that unemployment is negatively related to the establishment of new firms. This implies that as new businesses are established, employability is stimulated and unemployment reduces substantially (Garofoli, 2004; Audretsch & Fritsch, 1994). In the same vein, Lucas (1978) and Jovanovic (1982) asserted that high unemployment in the society is associated with a low degree of entrepreneurial activities, that is, where propensity to set up enterprises is low; the rate of unemployment would be very high. The implication of the above assertions is that those who are unemployed tend to remain so because they possess lower endowments of human capital and entrepreneurial talents required to start and sustain new enterprises to keep them going. A low rate of entrepreneurship culture and skills in any society may be a consequence of the low economic growth, which also reflects higher levels of unemployment (Audretsch, 1995, Oladele *et al.*, 2011).

However, the Schumpter effect is in line with the present study in the sense Motor Vehicle Mechanic's Work graduates who possess positive entrepreneurial capabilities and technology skills in modern motor vehicle diagnostics are likely to attain high levels of utility in self employment and a successful entrepreneurship.

2.3 Related Empirical Studies

Odigiri and Ede (2011) carried out a study on the integration of new technological innovations in automobiles into the curriculum of Nigerian Technical College programmes. The area of the study was Benue, Enugu and Kaduna states. The population of the study comprised of 81 subjects made up of all mechanical engineering or technology staff of the two automobile plants and auto-mechanic teachers in the technical colleges in these selected states. The entire population was used for the study. The instrument for data collection was a 41 item structured questionnaire designed

by the researcher based on the research questions used for the study. The findings of the study revealed that 41 new innovations comprising of 10 in the engine; 11 in the transmission, suspension, steering and braking systems; 20 in the electrical/electronic and auxiliary systems were rated as important to be integrated into the curriculum. Included among these prominent new automobile innovations are: electronic fuel injection system (EFI), electronic ignition system, variable valve timing intelligence (VVV-i), super charging, emission control systems, On-Board Diagnostic system, All Wheel Steering System (AWS), All Wheel Driving System (AWD) and Anti-lock Braking System (ABS) etc. The findings of this study also revealed that there is a significant difference in the mean responses of industrial workers and technical teachers on five of the identified new technological innovations in automobiles for which the null hypotheses were rejected. These items included the On-Board Diagnostic system, safety airbags and airbag curtains, automatic front windscreen wiper, automatic headlight brightness switch and multiplex wiring. Based on the findings and implications of the study, recommendations were made. These recommendations are as follows: Further studies should be conducted to identify all the other elements of the new innovations needed for the development of comprehensive curricular contents including the skills and theoretical contents entailed in their study as well as the new tools and equipment needed. The curriculum for teacher training programmes should be reviewed to include these innovations in order to prepare teachers who will be able to implement the curriculum with the new contents for the technical college programmes. The study is related to the current study in the aspect of new technological innovations in automobiles, though the study was conducted on mechanical staff of automobile plants and technical college teachers, the present study will be conducted on industrial supervisors, technicians and instructors in modern automobile workshops and technical colleges.

The literature gap between the integration of new technological innovations in automobiles into the curriculum of Nigerian Technical College programmes and the retraining needs of graduating motor vehicle students in the diagnosis of modern vehicles highlights the need for further research and action in the field of automotive education. By addressing this gap, educators and industry professionals can work together to ensure that graduating motor vehicle students are well-equipped with the knowledge and skills needed to succeed in the modern automotive industry. Many traditional automotive programs may still be teaching outdated methods and technologies, which can limit the preparedness of graduating motor vehicle mechanics students for the modern automotive workforce. Furthermore, there is a lack of research on the specific retraining needs of graduating motor vehicle students and how these needs can be met through continuing education and professional development opportunities. With the rapid advancements in vehicle technology, it is crucial for graduating motor vehicle mechanics students to be exposed to the latest tools, techniques, and systems used in the diagnosis and repair of modern vehicles.

Igwe (2017) carried out a study on competency improvement needs of Teachers in On- Board Diagnostic System for effective teaching of petrol engine maintenance in technical colleges in Nigeria. The area of the study was South-Eastern Nigeria. Eight research questions were formulated for the study in line with the components of OBD system which include: input devices, Output devices, Diagnostic Software and Diagnostic tools. Survey research and Borich needs assessment model design was used in the study. The population of the study comprised of 50 subjects made up of MVMW teachers who responded to a 53 item structured questionnaire designed by the researcher. The entire population was used. Three experts face validated the content of the instrument. Cronbach Alpha coefficient of reliability of 0.93 was established for the instrument. The major findings of the study revealed that teachers of MVMW in South-East states

of Nigeria need skill improvement training in On-Board Diagnostic (OBD) systems for effective teaching of Petrol Engine Maintenance. This is necessary in order to teach the students who will service the petrol engine vehicles that make use of OBD system effectively. Based on the findings, the recommendation among others is that there should be in-service training in OBD system for the teachers of Motor Vehicle Mechanic's Work. Both studies are carried out on Motor Vehicle Mechanic's Work. However they differ in the sense that Igwe's study identified competency improvement needs of teachers, the present study sought to find out the emerging technology skills required by MVMW graduates.

The relationship between competency improvement needs of teachers in On-Board Diagnostic system for effective teaching of petrol engine maintenance in technical colleges in Nigeria and the retraining needs of graduating motor vehicle mechanics students in the diagnosis of modern vehicles in Minna metropolis refers to the lack of research and resources focused on the specific topic of training and development for both groups of professionals. In recent years, the automotive industry has seen rapid advancements in technology, leading to an increase in the use of on-board diagnostics systems in modern vehicles. This has created a need for teachers to improve their competencies in the area of on-board diagnostics in order to effectively teach petrol engine maintenance to their students. At the same time, graduating motor vehicle mechanics students also need to be retrained in the diagnosis of these new systems in order to stay up-to-date with the latest technology and continue to provide effective service to their clients. There is a gap in the research that focuses on the specific competency improvement needs of teachers in the field of on-board diagnostics and the retraining needs of motor vehicle mechanics students in the diagnosis of modern vehicles. This gap represents an opportunity for further research and development in this area.

Ogbuanya and Fakorede (2015) carried out a study to ascertain the technical skills improvement needs of metal work technology teachers for entrepreneurship in response to Millennium Development Goal (MDG) for quality assurance, 16 technical colleges offering metal work technology in Lagos and Ogun states were used for the study. Three research questions were formulated to guide the study. A structured questionnaire was used to collect relevant data from 110 metal work teachers. Data collected were analyzed using the statistical mean and standard deviation. Cronbach Alpha Reliability technique of 0.98 was established for the instrument. The findings of the study revealed that metalwork technology teachers in technical colleges need modern metal work technology skills for quality training of metal work technology students in technical colleges for occupation in metal work industry and productive self employment. The recommendations of the study among others include the organization of an extensive training for metal work technology teachers in technical colleges in Lagos and Ogun states to keep them abreast with the contemporary practices as well as update their skills in metal work technology; the management of metal work industries and in-house personnel should be co-opted to consolidate teachers teaching with actual work experience.

The relationship between the technical skills improvement needs of metal work technology teachers for entrepreneurship and the retraining needs of graduating motor vehichle mechanics students in diagnosis of modern vehicles in Minna metropolis is such that highlights the importance of continued education and training in these fields. By providing metal work technology teachers and graduating motor vehicle mechanics students with the latest knowledge and skills, we can ensure that they are prepared to meet the challenges posed by the constantly evolving technology in modern vehicles. While metal work technology teachers may have a basic understanding of metalworking techniques, they may lack the advanced knowledge and skills

required to diagnose and repair modern vehicles. On the other hand, graduating motor vehicle mechanics students, who are trained in diagnosing and repairing vehicles, may need to retrain to keep up with the constantly evolving technology in modern vehicles.

Nwokolo (2015) conducted a study on training skills relevant for employment in metalwork industries in Nigeria: the way forward. Three research questions and three hypotheses were formulated to guide the study. A total of 105 technical teachers were involved in the study. The instrument used for the study was Metalwork Skill Training Questionnaire (MWSTQ). T-test statistical tool was used in the analysis of data. The findings showed that the young graduates need broad based technical skills which can be adapted to rapidly changing economic requirements as well as appropriate basic skills which they can benefit from. The recommendation of the study is that governments in collaboration with non-governmental and international organizations should provide funds for the purchase of adequate number of equipments tools and materials to facilitate skills acquisition. The study is related to the present study in the aspect of skills. Although, Nwokolo's study is based on training skills for employment, the present study is aimed at identifying emerging technology skills required by Technical College graduates of MVMW for establishing automobile enterprises.

The literature gap between training needs for relevant employment in metal work industries in Nigeria and the retraining needs of graduating motor vehicle mechanics students can be significant, as the two industries have different skill sets, technologies, and requirements. Metal work industries typically require workers to have knowledge of traditional metalworking techniques, such as welding, cutting, and fabrication, while motor vehicle mechanics must be able to diagnose and repair complex electronic systems in modern vehicles. The literature gap may reflect differences in the type of training and retraining resources available for each industry. For example,

there may be more resources available for graduating motor vehicle mechanics students, including online training programs and certification programs, to help them keep up with changes in the industry. On the other hand, metal workers may have fewer resources for retraining and may have to rely on on-the-job training or apprenticeships. Overall, the gap between the training skills needs and retraining needs of metal workers in Nigeria and graduating motor vehicle mechanics highlights the importance of ongoing education and training for workers in both industries to remain competitive in the job market.

Doka (2017) also investigated the knowledge and skills needs of technical college graduates for self-employment in metalwork trades in FCT and Nasarrawa state. Three research questions were designed for the study. Three hypotheses were postulated to guide the study and were tested at 0.05 level of significance. A survey research was adopted for the study. The total population of 124 respondent consisting of 45 metal work trade teachers, 39 welding and fabrication, 21 mechanical engineering and 19 foundry craft practice self employed technical college graduates. A 95 item structured questionnaire and five point likert scale was used as instrument for data collection after being subjected to face validation by three lecturers. The reliability coefficient of the instrument was 0.87 using cronbach alpha. Mean and standard deviation were used to answer the research question while t-test was used to test the hypotheses. A structured questionnaire was used to elicit information from 45 metalwork trade teachers, and 79 self-employed technical college graduates. The findings of the study showed that few technical college graduates of metal work trades are self employed in the study area. Based on these findings, the study recommends that the identified technical knowledge and skills needs of technical college graduates should form the basis for planning and teaching metal work trades namely, welding and fabrication, mechanical engineering practice and foundry craft practice. The State Ministry of

Education and Federal Capital Territory education secretariat should fund and provide facilities needed to enhance the effective acquisition of tech knowledge and skills in the teaching-learning process. The study is related to the current study in the aspect of skills. However, it differs in the sense that Doka's study is focused on technical college graduates of metalwork while the present study is aimed at Motor Vehicle Mechanic's Work graduates in technical colleges.

The relationship between the knowledge and skills needs for technical college graduates for self-employment in metal work trades in FCT and Nassarawa state and the retraining needs of graduating motor vehicle mechanics students in the diagnosis of modern vehicles in Minna metropolis highlights the need for the provision of additional training and educational opportunities in order to help them acquire the necessary skills and knowledge to remian competitive in their respective industries.

For the college graduates in the metal work field, there may be need for training in the use of new technologies and techniques used in metal work, such as computer-aided design and 3D printing, in order to stay competitive in the industry. On the other hand, graduating motor vehicle mechanics students may need retraining in the diagnosis and repair of modern vehicles, which often have increasingly complex electrical and computer systems.

In another work, Abd-El-Aziz and Adio (2018) carried out a study on new technologies of imported used cars needed to be incorporated into Auto-mechanics trade curriculum of technical colleges. Oyo state was used for the study. The population of the study consisted of 29 Auto-mechanic teachers from five technical colleges and 241 industry workers who are graduates of technical colleges. Three research questions guided the study. An 89-item structured questionnaire grouped into 3 sections with Cronbach Alpha Reliability coefficient of 0.78, 0.88 and 0.96 respectively sought information on new technologies, tools and equipment and the

competencies needed for inclusion into the auto-mechanic curriculum. The major findings in this study showed that out of the fifty items in section 1, forty-six were considered as technologies that should be incorporated into the curriculum while four items were considered as technologies that should not be considered. The study further found out that all the 26 items in section 2 were considered as important to be incorporated into the curriculum for training the students. The study also revealed that all the 13 items in section 3 of the questionnaire were considered as highly needed for inclusion in the technical college curriculum of auto-mechanics trade.

The literature gap between the new technologies of imported used cars needed to be incorporated into Auto-mechanics trade curriculum of technical colleges and the retraining needs of graduating motor vehicle students in the diagnosis of modern vehicles in Minna metropolis refers to the disparity between the existing curriculum in technical colleges and the skills required to diagnose and repair modern vehicles. This gap arises due to the rapid advancements in technology used in vehicles and the difficulty in keeping the curriculum up-to-date to reflect these changes. The diagnosis and repair of modern vehicles requires a deep understanding of complex systems, such as engine management, hybrid drivetrains, and advanced safety systems. This means that auto-mechanics trade curricula in technical colleges must be updated to include training on these systems, so that graduates have the necessary skills to work on these vehicles. There is a shortage of qualified instructors who are knowledgeable about the latest technologies used in vehicles. Secondly, the cost of training equipment, such as diagnostic tools and specialized training vehicles, is significant, and many colleges may not have the resources to invest in these tools. Finally, the pace of technological change in the automotive industry is rapid, and keeping the curriculum up-to-date can be a challenge. Bridging the literature gap between the new technologies of imported used cars and the retraining needs of graduating motor vehicle students is essential for ensuring

that these students have the necessary skills to work in the automotive industry. Addressing this gap will require collaboration, investment, and ongoing effort from the technical colleges, the automotive industry, and the government.

Yavala (2018) conducted a study to determine the work skills improvement need of graduates of technical colleges in motor vehicle mechanic practice for employment in modern Nigeria. The study was carried out in Taraba state of Nigeria. Three research questions were formulated to guide the research study. The study adopted a survey research design and the population of the study consisted of 40 graduates of motor vehicle mechanic practice from industries in the study area. There was no sample for the study, since the population was manageable. A structured questionnaire containing 43 work skill items was used for the collection of data from the respondents. The work skill questionnaire was divided into skills needed and performance with each having a 4-point response scale and a corresponding value of 4,3,2,1 for the two groups respectively. Split half method was employed to determine the internal consistency of the work skills questionnaire item with a reliability coefficient of 0.83. The instrument was analyzed using weighted mean and improvement needed index (INI). Findings of the study revealed that graduates of motor vehicle mechanics practice from technical colleges need improvement in work skills for engine maintenance, steering and braking system and auto electricity in order to be employed in Taraba state. The study therefore recommended that all the identified work skills in engine maintenance, steering and braking system and auto electricity should be integrated into the curriculum of motor vehicle mechanic practice in technical colleges for training students.

The literature gap between work skills improvement need of graduates of technical colleges in motor vehicle mechanic practice for employment in modern Nigeria and the retraining needs of graduating motor vehicle students in the diagnosis of modern vehicles in Minna metropolis is a

complex issue. On one hand, graduates of technical colleges in motor vehicle mechanic practice are often in need of improving their work skills in order to be competitive in the job market. This is due to the rapid pace of technological advancement in the field, which has led to a growing demand for mechanics who are knowledgeable about the latest diagnostic tools and techniques used in modern vehicles.

On the other hand, many graduating motor vehicle students lack the skills and knowledge needed to diagnose and repair the complex systems found in modern vehicles. This is due to a lack of exposure to these systems during their formal education and training, and the need for specialized training and retraining in order to keep up with the changing demands of the field. The gap between these two groups of workers highlights the need for ongoing professional development and training programs in the field of motor vehicle mechanics, to ensure that workers have the skills and knowledge they need to be successful in their careers. This includes both the development of new training programs and the adaptation of existing programs to meet the changing needs of the industry.

Overall, bridging this literature gap will require a coordinated effort from industry leaders, educators, and policy makers to ensure that workers in the field have the skills and knowledge they need to succeed in a rapidly changing industry.

2.4 Summary of Related Literature

Various areas concerning the history of Automobile, the kind of job of Roadside Automobile Mechanics were discussed. Innovation in automobile and technology as well as apprenticeship system of training roadside automobile mechanics have also been extensively reviewed on, throwing more lights on it weakness and strength. Also, new approach for automobile diagnosis

and repairs were not left behind where various diagnostic devices were researched upon, given their usage importance to the roadside automobile mechanics. All these were reviewed so that today's automobile technologist – roadside or others – being constantly challenged with new technology, will strive to improve on their knowledge and skills to help keep up with new changes in design and manufacturing of vehicles.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Research Design

This study employ descriptive survey design with questionnaire was used to seek opinions of the respondents. Nwoke and Olaitan (2013) defined a survey of research as a descriptive study in which the entire population or respective sample of the entire population is studied by collecting and analyzing of data from the group through the use of questionnaires. The survey design was considered suitable since this study will seek information from a sample that was drawn from a population using questionnaires.

3.2 Population

The target population of the study consists 133 respondents who are 28 motor vehicle mechanic teachers teaching automobile courses in schools located in Minna metropolis (FUT, Minna, COE, Minna, GTC, Minna and MITI, Minna) and 105 automobile workshop supervisors from registered automobile workshops located in Minna Metropolis of Niger State.

3.3 Sample and Sampling Technique

Convenient sampling was used in this study as a result of the scattered locations of Motor Vehicle mechanic workshops and Institutions in Niger State. This type of sampling is a non-probability and proximity to the study. In other words, subjects are selected just because they are close at hand for the study and the researcher did not consider selecting subjects that are representing the entire population (Aloysius, 1998). Therefore 28 motor vehicle mechanic teachers and 105 automobile workshop supervisors will be used as sample for the study.

3.4 Instruments for Data Collection

The instrument for data collection is a structured questionnaire developed for the study. The questionnaire consists of two sections A and B.

Section A deals with respondent' personal data. The items only extract the personal data required from the respondent.

Section B consist of research questions. research question one consists of 15 items which deals with the retraining needs of graduating motor vehicle mechanics in the use of OBD devices, research question two consist of 15 items which deals with the retraining needs of graduating motor vehicle mechanics in the use of GPS vehicle tracker and research question three consist of 15 items which deals with the strategies for acquiring the retraining needs of graduating MVM craftmen in diagnostics of modern vehicles

3.5 Validation of the Instrument

The instrument used for the study will be validated by two lecturers in the Department of Industrial and Technology Education, Federal University of Technology, Minna. Observations and

corrections raised will be effected in the final copy before the instrument will be administered to the respondents.

3.6 Method of Data Analysis

The data collected was analyzed using Statistical Package for Social Science (SPSS). Mean and Standard deviation was used to answer Research questions while t-test was used to analyse the hypotheses at 0.05 level of significance.

3.7 Decision Rule

To determine acceptance level, a mean of 2.50 will be used as deciding point between required and Not required. Any item with responses with mean of 2.50 and above will be considered required while the responses below 2.50 will be considered not required. A t-test will be used to test the hypothesis at 0.05 level of significance to compare the mean responses of two groups (motor vehicle mechanic teachers and automobile workshop supervisor).

CHAPTER FOUR

4.0 PRESENTATION AND ANALYSIS OF DATA

4.1 Research Question One

What are the retraining needs of graduating motor vehicle mechanics students in the use of OBD II devices?

Table 4.1: Mean responses of respondent on the retraining needs of graduating motor vehicle mechanics students in the use of OBD II devices

S/N	Items	$\bar{X}_1$ n_1=105	$\bar{X}_2$ n_2=28	$\bar{X}_T$ N=133	SD	Remarks
1.	Training on basic knowledge of on-board diagnostic	3.8	3.8	3.8	0.47	Needed
2.	Training on knowledge of OBD II codes and diagnostic procedures	3.8	3.2	3.5	0.16	Needed
3.	Training on understanding of OBD II system architecture and communication protocols	3.8	3.2	3.5	0.41	Needed
4.	Training on familiarity with OBD II data interpretation and analysis	3.6	2.8	3.2	0.45	Needed
5.	How to install OBD II device	3.2	3.2	3.2	0.37	Needed

6.	Training on proficiency in using OBD II software and hardware tools	3.4	3.2	3.3	0.00	Needed
7.	Training on the knowledge of OBD II systems in different vehicle makes and models	3.4	2.2	2.8	0.48	Needed
8.	Training in understanding of OBD II system-specific faults and trouble codes	3.4	3.2	3.3	0.27	Needed
9.	Trouble shooting with OBD II device	3.0	3.4	3.2	0.41	Needed
10.	How to handle difficult troubleshooting moments	3.2	3.0	3.1		Needed
11.	How to operate OBD II device	3.2	3.4	3.3	0.50	Needed
12.	How to use OBD as a diagnostic tool	3.4	2.6	3.0	0.31	Needed
13.	Training in familiarity with advanced OBD II diagnostic techniques and tools	3.4	2.8	3.1	0.25	Needed

Key: N_1 = number of motor vehicle mechanic teachers N_2 = number of automobile workshop supervisor, X_1 = mean of motor vehicle mechanic teachers X_2 = mean of automobile workshop supervisor X_t = mean for both respondents

The data presented in Table 4.1 reveal that all the respondents agreed with all the items with mean scores ranging between 2.80 – 3.80 on the retraining needs of graduating motor vehicle mechanics students in the use of OBD II devices based on decision rule. The result implies that graduating motor vehicle mechanics students needs training on the use of OBD II devices.

Research Question Two

What are the retraining needs of graduating motor vehicle mechanics in the use of GPS vehicle tracker?

Table 4.2: Mean responses of the respondents on the retraining needs of graduating motor vehicle mechanics in the use of GPS vehicle tracker

S/N	Item	$\bar{X}_1$ n_1=105	$\bar{X}_2$ n_2=28	$\bar{X}_T$ N=133	SD	Remarks
1.	Training on basic knowledge of Global Position System	4.0	3.8	3.9		Needed
2.	Training on how to interpret GPS signal	3.4	3.2	3.3		Needed
3.	Training on how to know faulty GPS setting	3.2	3.0	3.1		Needed
4.	Training on the repairs of GPS	3.0	3.0	3.0		Needed
5.	Training on problems associated with GPS	3.2	2.6	2.9		Needed
6.	Training on problems associated with wrong installation of GPS	3.4	3.2	3.3		Needed
7.	Training on how to understand GPS signal when connected	3.4	2.8	3.1		Needed
8.	Training on how to diagnose GPS signal from the computer	3.4	3.6	3.5		Needed
9.	Training on how to read GPS signal from the computer	3.4	3.0	3.2		Needed
10.	Training on how to understand GPS position on the computer	3.0	3.6	3.3		Needed
11.	Training on how to understand GPS tracking device	3.0	3.0	3.0		Needed
12.	Training on how to effectively operate vehicle tracking device	5.4	3.6	4.5		Needed
13.	Training on how to install GPS properly	3.6	3.0	3.3		Needed
14.	Training on how to trace GPS vehicle when stolen	3.2	2.8	3.0		Needed
15.	Training on how to read the maps of GPS vehicle tracking device	3.2	3.0	3.1		Needed

Key: N_1 = number of motor vehicle mechanic teachers N_2 = number of automobile workshop supervisor, X_1 = mean of motor vehicle mechanic teachers X_2 = mean of automobile workshop supervisor X_t = mean for both respondents

The data presented in Table 4.2 revealed that all respondents agreed with all the items with mean scores ranging between 2.9 – 4.5 on the retraining needs of graduating motor vehicle mechanics in the use of GPS vehicle tracker based on decision rule. The result implies that graduating motor vehicle mechanics students needs training on the use of GPS vehicle tracker.

Research Question Three

What are the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles?

Table 4.3: Mean responses of the respondents on the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles .

S/N	Items	$\bar{X}_1$ n_1=105	$\bar{X}_2$ n_2=28	$\bar{X}_T$ N=133	SD	Remark
1.	On-the-job training which involves providing hands-on training to graduating motor vehicle mechanics on modern vehicles and the latest diagnostic tools and techniques.	4.0	3.8	3.9		Needed
2.	Technical workshops and seminars conducted by experts in the field to gain more knowledge and skills in diagnostics.	3.2	3.6	3.4		Needed

3.	Online courses and resources such as e-learning platforms, videos, and webinars that mechanics can use to upgrade their skills and knowledge.	3.4	2.8	3.1	Needed
4.	Manufacturer training programs offered to mechanics on their latest vehicle models and diagnostic tools and techniques.	3.6	2.8	3.2	Needed
5.	Collaboration with educational institutions to provide training opportunities for graduating motor vehicle mechanics students.	3.4	2.6	3.0	Needed
6.	In-house training programs to upgrade the skills of graduating motor vehicle mechanics students.	3.2	2.6	2.9	Needed
7.	Certification programs in modern diagnostic techniques, which can enhance their credibility and knowledge in the field.	3.4	3.2	3.3	Needed

Key: N_1 = number of motor vehicle mechanic teachers N_2 = number of automobile workshop supervisor, X_1 = mean of motor vehicle mechanic teachers X_2 = mean of automobile workshop supervisor X_t = mean for both respondents

The data presented in Table 4.3 reveals that all the respondents agreed with all the items with mean score of 2.5 – 4.5 on the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles. This implies that retraining needs is necessary and from the data gathered from the respondents, it shows that it should be carried out to equip them with the necessary training needed in the diagnostics of modern vehicles.

Testing of Hypotheses

Ho_1: There is no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of OBD scan tools in Minna Metropolis.

Table 4.4: t-test analysis of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of OBD scan tools in Minna Metropolis

Respondents	N	Mean	SD	t-value	p-value	Remarks
motor vehicle mechanic teachers	105	3.09	0.53	0.57	0.11	Not Significant
automobile workshop supervisors	28	3.11	0.83			

Table 4.4 shows the t-test results of the comparison of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of OBD scan tools in Minna Metropolis. There is no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of OBD scan tools in Minna Metropolis, $t = 0.57$, $p = 0.11$, ($p>0.05$). Therefore, the hypothesis is accepted.

Ho_2: There is no significant difference in the mean responses of the respondents on the retraining needs of roadside automobile mechanics in the use of GPS vehicle tracker.

Table 4.5: t-test analysis of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of GPS vehicle tracker in Minna Metropolis

Respondents	N	Mean	SD	t-value	p-value	Remarks

motor vehicle mechanic teachers	105	2.84	0.05	0.309	0.75	Not Significant
automobile workshop supervisors	28	2.61	0.94			

Table 4.5 shows the t-test results of the comparison of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of GPS vehicle tracker in Minna Metropolis. There is no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of GPS vehicle tracker in Minna Metropolis, $t = 0.309$, $p = 0.75$, ($p>0.05$). Therefore, the hypothesis is accepted.

Ho_3: There is no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles

Table 4.6: t-test analysis of motor vehicle mechanic teachers and automobile workshop supervisors on the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles

Respondents	**N**	**Mean**	**SD**	**t-value**	**p-value**	**Remarks**
motor vehicle mechanic teachers	105	2.70	0.29	0.288	0.77	Not Significant
automobile workshop supervisors	28	2.50	0.35			

Table 4.6 shows the t-test results of the comparison of motor vehicle mechanic teachers and automobile workshop supervisors on the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles. There was no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles, $t = 0.288$, $p = 0.77$, ($p>0.05$). Therefore, the null hypothesis is accepted.

4.3 Summary of Major Findings

4.3 Findings

1. Graduating Motor Vehicle Mechanics Students needs retraining in the use of OBD II devices.
2. Graduating Motor Vehicle Mechanics Students needs retraining in the use of GPS vehicle tracker.
3. Graduating Motor Vehicle Mechanics Students needs retraining in diagnostics of modern vehicles
4. There was no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of OBD scan tools in Minna Metropolis.
5. There was no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the retraining needs of graduating motor vehicle mechanics students in the use of GPS vehicle tracker in Minna Metropolis.

6. There was no significant difference between the mean responses of motor vehicle mechanic teachers and automobile workshop supervisors on the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles

Discussion of result

The findings on the retraining needs of graduating motor vehicle mechanics students in the use of OBD II devices revealed that all the respondents agreed on all the items. The findings of the study is inline with the study of Igwe (2017) who carried out a study on competency improvement needs of Teachers in On- Board Diagnostic System for effective teaching of petrol engine maintenance in technical colleges in Nigeria. The area of the study was South-Eastern Nigeria. The major findings of the study revealed that teachers of MVMW in South-East states of Nigeria need skill improvement training in On-Board Diagnostic (OBD) systems for effective teaching of Petrol Engine Maintenance. This is necessary in order to teach the students who will service the petrol engine vehicles that make use of OBD system effectively. Based on the findings, the recommendation among others is that there should be in-service training in OBD system for the teachers of Motor Vehicle Mechanic's Work.

The findings on the retraining needs of graduating motor vehicle mechanics students in the use of GPS vehicle tracker revealed that all the respondents agreed on all the items. The findings of the study agreed with Ogbuanya and Fakorede (2015) carried out a study to ascertain the technical skills improvement needs of metal work technology teachers for entrepreneurship in response to Millennium Development Goal (MDG) for quality assurance, 16 technical colleges offering metal work technology in Lagos and Ogun states were used for the study. The findings of the study revealed that metalwork technology teachers in technical colleges need modern

metal work technology skills for quality training of metal work technology students in technical colleges for occupation in metal work industry and productive self employment.

The findings on the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles revealed that all the respondents agreed on all the items. The findings of the study corroborates with Abd-El-Aziz and Adio (2018) carried out a study on new technologies of imported used cars needed to be incorporated into Auto-mechanics trade curriculum of technical colleges. Oyo state was used for the study. Findings of the study revealed that graduates of motor vehicle mechanics practice from technical colleges need improvement in work skills for engine maintenance, steering and braking system and auto electricity in order to be employed.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusion

The study investigate the retraining needs of graduating motor vehicle mechanics students in diagnostics of modern vehicle in Minna metropolis. The study established three objectives, research question and hypothesis to guide the study. The study revealed that the advancement in automobile affects graduating MVM students due to the inadequacy on the use of modern diagnostic devices which to some of them is costly and since they don't have enough basic knowledge on the use of it, they seldom want to use it, so they prefer their old methods of diagnosis of vehicle. This means that effort should be made by the graduating MVM students to acquire the knowledge needed to operate these modern diagnostic devices in diagnosing of modern vehicles.

5.2 Recommendations

Based on the findings of this study, the following recommendations were made.

1. Graduating MVM students should be trained on the use of modern automobile diagnostic devices so that they may be able to diagnose problems and troubles relating to the use of modern vehicles.
2. Professional bodies like National Automotive Council (NAC) should teach Roadside Automobile Mechanics on the principal applications of modern diagnostic devices on modern vehicles and also train them on theoretical and practical skills that govern the operations and technicalities accompanying various systems of modern vehicles
3. Technical colleges should equip their workshop with modern computerized diagnostic devices in order to cope with the repairs of the fast growing trends of hi-tech vehicles in automobile industry.
4. Establishing strong partnership and linkage between MVM students workshop and formal sector automobile maintenance industries.
5. Improving apprenticeship training practices.

5.3 Suggestion for Further Study

1. Developing a curriculum for the training of Roadside Automobile Mechanics on the use of sophisticated and computerized automobile diagnostic equipment.
2. Retraining needs of roadside automobile mechanics in basic computer literacy
3. Retraining needs of roadside automobile mechanics in maintenance of electronic contol units.
4. Retraining needs of roadside automobile mechanics in repairs of automatic transmission systems.

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APPENDIX A

REQUEST FOR VALIDATION OF RESEARCH INSTRUMENT

Dear Sir,

I am a student of Federal University of Technology, Minna in the Department of Industrial and Technology Education. I am currently carrying out a study titled: **Retraining Needs Of Graduating Motor Vehicle Mechanics Craftmen In Diagnosis Of Modern Vehicles In Minna Metropolis**.

I therefore request that you validate the attached instruments (questionnaire). Please check the questionnaire against the specific research question to ascertain their conformity, meaningfulness and logical sequence based on the content covered. I also request that you check the suitability and clarity of the questionnaire with a view of identifying relevant information(s) vital to the study but not reflected. Kindly remove all ambiguous or irrelevant statements so that instrument will be easily understood.

Thanks.

Validated by:

Name: _____

Sign: _____

Date: _____

APPENDIX B

QUESTIONNAIRE ON RETRAINING NEEDS OF GRADUATING MOTOR VEHICLE MECHANICS STUDENTS IN DIAGNOSIS OF MODERN VEHICLES IN MINNA METROPOLIS

Dear respondent,

This Questionnaire is designed to obtain information on **Retraining Needs of Graduating Motor Vehicle Mechanics student in Diagnosis of Modern Vehicles in Minna Metropolis**. Please, kindly assist by filling the necessary information where appropriate. Any information obtained will be held in strict confidence and will be used solely for the purpose of this academic study. Please tick or write in the appropriate location.

SECTION A

Motor vehicle mechanic teacher ( )

Automobile workshop supervisor ( )

HN= Highly Needed (4 points)
N= Needed (3 points)
MN= Moderately Needed (2 points)
NN= Not Needed (1 point).

SECTION B

HN= Highly Needed (4 points), N= Needed (3 points), MN= Moderately Needed (2 points)

NN= Not Needed (1 point).

RESEARCH QUESTION ONE

1. What are the retraining needs of graduating motor vehicle mechanics students in the use of OBD II devices?

S/N	Items	HN	N	MN	NN
1.	Training on basic knowledge of on-board diagnostic				
2.	Training on knowledge of OBD II codes and diagnostic procedures				
3.	Training on understanding of OBD II system architecture and communication protocols				
4.	Training on familiarity with OBD II data interpretation and analysis				
5.	How to install OBD II device				
6.	Training on proficiency in using OBD II software and hardware tools				
7.	Training on the knowledge of OBD II systems in different vehicle makes and models				
8.	Training in understanding of OBD II system-specific faults and trouble codes				
9.	Trouble shooting with OBD II device				
10.	How to handle difficult troubleshooting moments				
11.	How to operate OBD II device				
12.	How to use OBD as a diagnostic tool				

13.	Training in familiarity with advanced OBD II diagnostic techniques and tools				

RESEARCH QUESTION TWO

2. What are the retraining needs of graduating motor vehicle mechanics in the use of GPS vehicle tracker?

S/N	Items	HN	N	MN	NN
14.	Training on basic knowledge of Global Position System				
15.	Training on how to interpret GPS signal				
16.	Training on how to know faulty GPS setting				
17.	Training on the repairs of GPS				
18.	Training on problems associated with GPS				
19.	Training on problems associated with wrong installation of GPS				
20.	Training on how to understand GPS signal when connected				
21.	Training on how to diagnose GPS signal from the computer				
22.	Training on how to read GPS signal from the computer				
23.	Training on how to understand GPS position on the computer				
24.	Training on how to understand GPS tracking device				
25.	Training on how to effectively operate vehicle tracking device				

26.	Training on how to install GPS properly				
27.	Training on how to trace GPS vehicle when stolen				
28.	Training on how to read the maps of GPS vehicle tracking device				

RESEARCH QUESTION THREE

What are the strategies for acquiring the retraining needs of graduating MVM students in diagnostics of modern vehicles?

S/N	**Items**	**HN**	**N**	**MN**	**NN**
29.	On-the-job training which involves providing hands-on training to graduating motor vehicle mechanics on modern vehicles and the latest diagnostic tools and techniques.				
30.	Technical workshops and seminars conducted by experts in the field to gain more knowledge and skills in diagnostics.				
31.	Online courses and resources such as e-learning platforms, videos, and webinars that mechanics can use to upgrade their skills and knowledge.				
32.	Manufacturer training programs offered to mechanics on their latest vehicle models and diagnostic tools and techniques.				
33.	Collaboration with educational institutions to provide training opportunities for				

	graduating motor vehicle mechanics students.				
34.	In-house training programs to upgrade the skills of graduating motor vehicle mechanics students.				
35	Certification programs in modern diagnostic techniques, which can enhance their credibility and knowledge in the field.				