SKILLS ACQUISITION NEEDS OF MOTOR VECHICLE MECHANICS STUDENTS IN THE MAINTENANCE OF ELECTRONIC IGNITION SYSTEM

BY

FATUNBI TobiJohana
2017/3/67644TI

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA.

AUGUST, 2021

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A RESEARCH PROJECT SUBMITTED TO THEDEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION,FEDERAL UNIVERSITY OF TECHNOLOGY MINNA, IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF BACHELOR OF TECHNOLOGY DEGREE (B. TECH) IN INDUSTRIAL AND TECHNOLOGY EDUCATION

(AUTOMOBILE OPTION)

AUGUST, 2021

DECLARATION

I, FATUNBI TOBI JOHANA, with matriculation number 2017/3/67644TI, 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.

FATUNBI TOBI JOHANA
2017/3/67644TI

…….
Signature and Date

CERTIFICATION

This project has been read and approved as meeting the requirement 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	...……..
Project Supervisor	Sign & Date
Dr. I. Y. Umar	……
Head of Department	Sign & Date
……	……..……..
External Examiner	Sign & Date

DEDICATION

This project is dedicated to Almighty God in His infinite mercies for sparing my life through the programme.

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My profound praise and gratitude goes to Almighty God, who has given me the opportunity to complete my course successfully, may His name alone be praised forever. My sincere appreciation goes to my project supervisor, Mr.Abutu Francis and my reader Dr. A.M. Idris for their unrelenting assistance and suggestion in the process of writing this research work,may God bless you abundantly. I also appreciate the efforts of the HOD, Dr I.Y. Umar and all the lecturers in the department.

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ABSTRACT

The study determined the skill acquisition needs of motor vehicle mechanics students for maintenance of electronic ignition system. The specific purpose of this study was to identify the skills needed by motor vehicle mechanics students in maintenance of capacitive discharge ignition system, identify the skills needed by motor vehicle mechanics students in maintenance of inductive storage ignition system, identify the skills needed by motor vehicle mechanics students in maintenance of transistor assisted contact ignition system. A descriptive survey design was adopted for this study. Four(4) research questions and three null hypotheses were formulated and tested at 0.05 level of significance. A total of 103 respondents were targeted for the research. A structured questionnaire containing 15 items were used for collecting data from the respondents. The data collected was statistically analyzed using mean distribution, standard deviation and t-test. The null hypothesis was tested at 0.05 level of significance as the accepted value for educational research and technical research. The findings revealed that each of the types of the electronic ignition system have different skills applicable to them, this skills includes proper fittings of transformer, use of standard coil in place of transformer for capacitive discharge ignition system. Checking blown fuse with wires short-circulated and measuring conductor using wire gauge for inductive storage ignition system. Ability to verify good spark plug, disconnecting already existing ignition condenser before repairs in transistor assisted contact ignition system. The strategies involved in acquiring the needed skills for maintenance of electronic ignition system includes carrying out demonstration in all practical activities, field trip/ excursion to well established auto-electricity/electronics industries and workshop. If all those variables mentioned can be taken into consideration there will be effective ways Motor Vehicle Mechanics students acquire the needed skills for maintenance of electronic ignition system in technical colleges.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Every individual is either naturally or trained to perform special tasks in order to overcome some challenges in their lifetime. Skills are the abilities and knowledge needed to perform specific tasks; they are practical, and often relate to mechanical, information technology, mathematical, or scientific tasks (Cranmer, 2014). United Nation Educational Scientific and Cultural Organisation regarded skill as an ability to do in context which is described using learning outcomes; influenced by work-based learning, linking of technical and vocational education and training systems with the labour market and employability (John et al., 2016).

Similarly, Africa Economic Brief (AEB) describes skills as an ability to perform a particular mental or physical activity that may be developed through vocational training or practice (AEB, 2015). Some examples include knowledge of programming languages, design programs, mechanicals and electrical repairs and maintenance. These skills enable groups and individuals to tackle various sorts of issues and problems effectively which are commonly faced in daily life. They are the abilities for adaptive and positive action and step that enable human beings to deal with every life challenges and situations effectively (Udogu, 2015). Hence the needs for the acquisition of these skills most especially, on the technical and vocational education which entails the maintenance and repair of mechanical and electrical devices.

Acquisition of skill is a type of learning in which repetition results in enduring changes in an individual's capability to perform a specific task. With enough repetition, performance of the task eventually may become automatic, with little need for conscious oversight. Any behavior that needs to be learned and that is improved by practice can be considered to be a skill (Offiong et al., 2016). Skill acquisition is also regarded as the form of training by individuals or group of individuals that can lead to acquisition of knowledge for self-sustenance. It involves the training of people in different fields of trade under a legal agreement between the trainers and the trainees for certain duration and under certain conditions (Idoko, 2014). Skills acquisition has been described by scholars as the recipe for eradicating extreme poverty and hunger by creating avenues for employment, thereby introducing an avenue for jobs and wealth creation while instilling self-sufficiency and reliance (Scott, 2016). The automobile (Motor Vehicle) industry is one of the most skilled required industries in the world, which requires series of expert in various sections of its operations most especially on the maintenance and repairs unit.

The automobile is a generic term for a self-propelled, trackless, non-articulated, four-wheeled land vehicle which encompasses passenger cars, recreational vehicles, taxies and buses used to transport people in cities, on highways or across country (Audu et al., 2015). The development of the automobile was undoubtedly a prime mover in the phenomenal collapse in time and space of travel, an important element of what has come to be known as globalization. The automobile has now become an indispensable means of transportation in modern societies (Scott, 2016).

Technological dynamism coupled with the emergence of new technologies has however, influenced the modern automobiles. There have being a continual evolution in design intended to

achieve faster, more reliable, more streamlined, cleaner and safer vehicles with enhanced comfort, fuel economy and longevity. Harnessing new technologies into the vehicles have made the sophisticated technologies (Scott, 2016). The introductions of electronic controls have particularly brought even greater changes in designs and operations of many of their sub-systems.

The electrical/electronic systems in the motor vehicle are important systems of the vehicle, which are responsible for the generation of power for the operation of the vehicle's components and provide a control mechanism for smooth operation of the components. (Alimi et al., 2015) asserted that the enormous advancement in electronic technology throughout the 1980s and 1990s, have brought about many changes in the status of automobile electronic system. The automobile electrical works module covers four major units of the motor vehicle, which include starting system, charging system, ignition system and lighting and accessory system.

The Electrical Ignition System (EIS) is an ignition system that uses electronic circuits, usually with the aid of transistors controlled by sensors to generate electric pulses which in turn generate the better spark that can even burn the lean mixture and provide better economy and lower emission (Peter, 2016). The widest application for spark ignition internal combustion engines is in petrol (gasoline) road vehicles such as cars and motorcycles. The electronic ignition system works electrically without power from the crankshaft and as a result, it does not overload the performance of the engine, although require adequate maintenance and expert repairs (Audu et al., 2016).

The demand for automobiles in Nigeria have continued to increase, especially following the collapse of the rail transport system in the midst of undeveloped inland water ways and a very high

cost of air transport which is also plagued by high rates of mishaps. Assorted brands and models of automobiles therefore abound today on the Nigerian roads, used for either public or convenience and luxury of personal transportation (Okwelle et al., 2017).

The automobiles therefore come in with a wide range of classical and new technologies. Most of these vehicles uses electrical ignition system which must be serviced and properly maintained and repair as required in order to keep them in roadworthy conditions, prevent loss of lives and properties. Service personnel (craftsmen) must therefore be equipped with the relevant knowledge and skills for these purposes (Okwelle et al., 2017).

In Nigerian school system, the programmes for the education and training of craftsmen and master craftsmen for the maintenance and repairs of electrical ignition system of all types of motor vehicles are carried out in technical colleges at the National Technical Certificate (NTC) and Advanced National Technical Certificate (ANTC) levels, respectively, (National Board for Technical Education - NBTE, 2018). However, several studies conducted all revealed that the products of these programmes lacked the basic skills needed for craftsmen to maintain and repairs motor vehicles as well as gainful employment in today's automobile industry (Audu et al., 2016). The curriculum was blamed for not being adequate and relevant to offer enough of the skills needed to meet the challenges that are involved in the maintenance and repairs of modern automobiles on Nigerian roads.

1.2 Statement of the Problem

Acquisition of Technical and Vocational Education and Training (TVET) has been discovered to be imperatives for achieving the National Industrial Revolution Plan in Nigeria (Offiong et al., 2016). Motor Vehicle Mechanic (MVM) trade is one of the vocational training skill programmes operated basically through the informal setting with apprenticeship mode of instruction and formally in technical Colleges, polytechnics among others. It is designed to produce competent motor Vehicle artisans for the technological and industrial development of the society. In Nigeria, Motor Vehicle Mechanic Works trade as a vocational training programme is offered in Technical Colleges, companies and designated skills acquisition centers of Motor Vehicle Workshops across the Nigeria. It is expected that those who acquired MVM skills are fully grand in various unit of maintenance and repairs automobile (Motor Vehicle Mechanics) most especially in the Electronic Ignition System (EIS) (Okwelle et al., 2017).

The scarcity of qualified and well skilled craftsmen in the maintenance and repairs of EIS in automobile has been a great challenge to user of motor vehicle in Nigeria as trained craftsmen in EIS are not giving up to expectation. The performance of automobile craftsmen as not being encouraging from findings of numerous studies (Targema et al., 2019). The craftsmen performance in repairs and maintenance of motor vehicle is rated to be poor as the finding of the study reveals a very low ranking of their craftsmanship performance most especially in electrical/electronic systems in the motor vehicle.

Expanding and improving craft training is critical in order to improve skills, attract younger craft workers into the automobile industry, decrease accident rates, and greater skill and knowledge in the maintenance and repairs of new technologies in electronic/electrical system of automobile (Momo, 2016).

The gaps created between the curriculum and the new technological innovations have made the needed skills for effective maintenance of these new breed automobiles to continue to elude the products of these programmes. The result has been that, the graduates of these programmes are often unemployable or under- skilled while most automobiles with these new innovations either suffer disrepair or have the new systems replaced by the classical substitute systems that the new ones were meant to improve upon (Nathaniel et al., 2019). Yet some are even completely grounded just barely into their expected service lives because of lack of competent personnel for their effective maintenance.

As measures to keep education and training of craftsmen in tune with the knowledge and skills needed in the world of work, school courses and curricula must be reviewed, enriched and updated regularly in line with changes that are taking place in the industries (Nathaniel et al., 2019). Thus, it was imperative to investigate the new technological innovations in automobiles with the view to identifying those that posed new challenges in the maintenance personnel in Nigeria for integration into the curriculum for their training programmes in order to avoid failure, accident and loss of lives and properties. This study, was therefore designed to identify the skill acquisition needs of vehicle mechanics students in maintenance of electronic ignition system.

1.3 Purpose of the Study

The purpose of the study is to assess skill acquisition needs of motor vehicle mechanics students in the maintenance of electronic ignition system.

The specific objectives of the study are to: -

1. identify the skills needed by motor vehicle mechanics students in the maintenance of capacitive discharge ignition system.
2. identify the skills needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system.
3. identify the skills needed by motor vehicle mechanics students in the maintenance of transistor assisted contact ignition system.
4. determine the strategies involved in acquiring the needed skill the maintenance of electronic ignition system.

1.4 Significance of the Study

This research will be of great importance to the following motor vehicle mechanics students, automobile teacher/trainer, auto electricians, National Board for Technical Education, and automobile companies.

The study would bring insights into the skill needed by the motor vehicle mechanics students to meet the technological advancement in automobile industry most especially the electronic ignition

system, as it would create awareness of the needed skill to be included in the curriculum in order to improve the quality of skill giving to the student.

To the auto electricians, the findings will indirectly result to improvement in quality of service delivery, as the needed skills will be disclosed and recommended in this study, in order to improve their level expertise in the maintenance of electronic ignition system in motor vehicle.

The National Board for Technical Education will be aware of practical electronic ignition skills needed by automobile graduates in the maintenance of modern vehicles. National Board for Technical Education could use this identified skill to update the pedagogy and components of the curriculum for automobile technology in tertiary institutions and technical colleges.

The findings of the study will be of immense benefit to the automobile teachers/ trainers to acquire practical and new technological skills needed to improve their level of expertise to enhance productivity. It will help the teachers/ trainers to know the strategies involved in acquiring the needed skills for maintenance of electronic ignition system will be exposed and recommended to their teachers/trainer.

To the researcher the finding of the study will add to the already existing literatures of the required skill by motor vehicle mechanics students in automobile industry. Similarly, this study can additionally serve as a source of reference for future academic studies.

To the automobile companies the findings will be of great benefit when incorporated into the curriculum content of automobile technology in technical colleges and tertiary institutions as it will produce competent automobile graduates, craftsmen, technicians, technologists and engineers who

will adapt to the dynamic nature of modern vehicles. They will be fully equipped with adequate practical skills needed in effective maintenance of electronic ignition system.

1.5 Scope of the Study

The study is delimited to assessing the skill acquisition needs of motor vehicle mechanics students in the maintenance of electronic ignition system. The study will cover only three types of electronic ignition system namely: capacitive discharge ignition system, inductive storage ignition system, transistor assisted contact ignition system.

1.6 Research Questions

The following research questions were raised to guide the study: -

1. What are the skills needed by motor vehicle mechanics students in the maintenance of capacitive discharge ignition system?
2. What are the skills needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system?
3. What are the skills needed by motor vehicle mechanics students in the maintenance of transistor assisted contact ignition system?
4. What are the strategies involved in acquiring the needed skill in the maintenance of Electronic Ignition System?

1.7 Research Hypotheses

The following hypotheses will be tested at 0.05 level of significance

1. H_{01}: There is no significant difference in the mean response of automobile teachers/lecturers and master auto electricians on the skill needed in the maintenance of capacitive discharge ignition system
2. H_{02}: There is no significant difference in the mean response of automobile teachers/lecturers and master auto electricians on the skill needed in the maintenance of inductive storage ignition system
3. H_{03}: There is no significant difference in the mean response of automobile teachers/lecturers and master auto electricians on the skill needed in the maintenance of transistor assisted contact ignition system.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Theoretical Framework

Speelman (2005), cited in Nathaniel et al. (2019), believes that there are two groups of theories regarding skill acquisition. The first group holds that skill acquisition results from a process of strategy refinement. This is the idea underlying the theories of Crossman, Anderson (ACT-R), Newell et al. (SOAR), MacKay, and some connectionist theories. The other group holds that skilled performance is the results of improved memory retrieval, this idea can be found in the theories of Logan (Instance theory) and Palmeri (EBRW).

Adaptive Control of thought Model (ACT)

Adaptive Control of Thought (ACT) model, developed by John Anderson, is the most well-known models of skill-based theories (Hiller and Coobes, 2014). Anderson (1982, as cited Targema et al., 2019) proposed a framework for skill acquisition including two major stages in the development of a cognitive skill, i.e., declarative and procedural stage. In this framework "facts are encoded in a propositional network and procedures are encoded as productions" (Targema et al., 2019). According to Hiller and Coobes (2014), "Within this theory, development involves the use of declarative knowledge followed by procedural knowledge, with the latter's automatization". Therefore, craftsmen skills are conceived to be a progression through three stages, declarative, procedural, and autonomous. These three stages resembles the three stages of cognitive, associative, and autonomous stage which (Machief, 2016) posits for skill acquisition.

Targema et al. (2019) has linked Anderson and Fitts stages by saying "In the cognitive stage knowledge is declarative and needs to be interpreted. Interpreting knowledge is slow, and may lead to errors if the relevant knowledge cannot be retrieved at the right time. Procedural knowledge on the other hand is compiled and therefore fast and free of errors, and can be associated with the autonomous stage. The associate stage is an in-between stage, during which part of the knowledge is declarative and another part compiled".

Ackerman's Model

According to Poropet (2014) Ackerman's model theory posits that there are different abilities underlying performance at consecutive stages of skill acquisition. In phase 1, general ability measures (e.g., abstract reasoning) underlie performance. With the formation of the production systems for the consistent features of performance, the influence of these factors decreases, and perceptual speed abilities appear as important predictors of performance in Phase 2. Eventually, performance is determined mainly by non-cognitive psychomotor abilities in Phase 3.

Moreover, Skill Acquisition Theory provides a rationale for the strong-interface position (Ellis & Shintani, 2015). And this "position holds that explicit knowledge can be transformed into implicit knowledge through the process of automatization, which is a consequence of practice" (Richards & Schmidt, 2014). Therefore, it seems that this theory has not considered the important role which is played by the affective factors in the process of learning. That is, contrary to the claim made by Newell & Rosenbloom (1981, as cited in Dekeyser and Criado, 2013) concerning the power law of practice, it can be claimed that if the beneficial affective factors are not observed (e.g., in stressed

situations), "plotting the logarithm of the time to perform a task against the logarithm of the trial number" does not necessarily yield a straight line.

The other point which should be mentioned is that though Ellis & Shintani (2015) believe that Skill Acquisition Theory provides a rationale for the strong-interface position, the evidence for all of the three positions (i.e., the non-interface position, the strong interface position, and the weak interface position) is mainly indirect, and they have not been empirically investigated. In fact, this is also the very problem which undermines Skill Acquisition Theory since, as mentioned by (Dekeyser and Criado, 2013) this theory is under-researched. Dekeyser has attributed this scarcity of research to the methodological problems such as difficulty in gathering large numbers of participants over long periods of time which is usually required for investigating this theory, and also to difficulties in controlling the variables in such studies.

Also, practice emphasized in this theory, as mentioned by Dekeyser and Criado (2013), is effective only for learning similar tasks which does not transfer to dissimilar tasks. Therefore, it can be claimed that this point disregards the creative potentials of human being.

The other criticisms levelled against Skill Acquisition Theory has been put forward by Ellis and Shintani (2015) who believes that this theory does not account for two important aspects. That is, first, it fails to explain the sequence of acquisition. And, second, the idea that the acquisition of all features starts with declarative knowledge is rather far-fetched, since both vocabulary and grammar acquisition in an must involve incidental learning to a great extent and such learning does not need a declarative stage.

At the same time, there are other scholars, who adhering the advantages of the Skill Acquisition Theory, hold views some of which contradict with those of the critics of this theory. For example, Poropet (2014) have discussed how skill theory can be applied in classroom settings.

1. "Skill theory can be used to study development during very short as well as long time periods, and across cognitive, social and language domains.
2. "Skill theory provides a coherent and practical means of defining and identifying the skills and sequences in learning activities".
3. This theory "predicts uneven development, not just across large domains, but even in narrow ones. For example, a student might be able to count a large number of beans from a jar but be unable to count the number of his classmates".
4. "By using a skill theory analysis teacher can begin to understand the effect of support and practice on range of performance. The range of performance observed during lessons that might have been used for many years suddenly can be understood and controlled." (Poropet, 2014)

In fact, in spite of the shortcomings leveled against Skill Acquisition Theory, as mentioned by Trofimovich and McDonough (2013), this theory fits very well with other aspects of cognitive science. Also, the approach to skill learning has proven to be robust over time, in spite of changes in emphasis, methodology, and terminology. Moreover, the procedure of research in this theory, whether conducted with behavioural data or through neuro-imaging or computer modelling is very explicit, e.g., power curves, computer programs and brain-scanners provides precise answers. Furthermore, research in this field is developmental and rather than providing snapshots of learners

it can document learning day after day. Moreover, though research may have less to say about the acquisition order of the language elements in comparison to other more (psycho-) linguistically oriented approaches, but it is explicit and precise regarding the steps that a learner takes during the acquisition of a specific structure.

2.2 Conceptual Framework

2.2.1 Technical and Vocational Education and Training (TVET) programme in Nigeria

Technical and vocational education and training (TVET) in Nigeria aims to assist the federal and state education authorities in their effort to revitalize reform and expand the provision of skills, vocations, science and technology to meet the nation's present and future socio-economic needs (Peter et al., 2014). The Federal Ministry of Education, the Federal Ministry of Science and Technology, and the Federal Ministry of Labour and Productivity are responsible for the development of TVET and related policies. The governance system is decentralized and a number of actors contribute to different aspects of the TVET system, including (Iro et al., 2016):

i. The National Board for Technical Education (NBTE) is a Federal Government parastatal and regulatory body operating under the ambit of the Ministry of Education. The management of the board is made up of the executive secretary and the directors who give leadership to the various departments of the board. It provides standardized minimum guides for the TVET curricula, and supervises and regulates, through an accreditation process, the programmes offered by technical institutions at secondary and post-secondary education levels.

ii. The Federal Inspectorate Service performs a number of functions, including the design of monitoring and evaluation instruments for measuring the quality of education. It also works together with the Nigerian Educational Research and Development Council, the faculties of education, institutes of education and other national and international bodies on curriculum development, delivery and pedagogical practices in secondary technical and vocational education.

iii. The Nigerian Educational Research and Development Council develops curricula for the primary and secondary levels of the Nigerian education system.

iv. The National Business and Technical Examinations Board (NABTEB) issues and validates certificates and administers technical and business examinations.

Other organizations involved in administering formal and non-formal TVET include local education authorities, intergovernmental organizations such as the Economic Community of West African States (ECOWAS), and private sector actors.

Financing

The Ministry of Education, the Ministry of Finance and the Ministry of Labour and Productivity are responsible for financing the formal and non-formal TVET. The Federal Government allocates the budget for the TVET system (FRN, 2014).

Additional resources are mobilized through the Tertiary Education Trust Fund (TETFUND). The TETFUND imposes a 2% education tax on the assessable profit of all registered companies in Nigeria. The Federal Inland Revenue Service (FIRS) assesses and collects the education tax, and

the TETFUND administers the tax and distributes the resources to tertiary educational institutions at the federal and state levels. It also monitors the projects executed with the funds allocated to the beneficiaries (Tunji et al., 2016).

TVET in the formal education system is not free. There are no uniform fees charged among institutions. Governments at various levels charge different fees.

TVET Teachers and Trainers

Teaching staff in the TVET system are designated as lecturers or instructors/technologists.

Whereas the lecturers teach the theoretical and analytical components of the courses, the instructors concentrate on workshops and practical elements.

Lecturers and instructors at the lower secondary education level need to attain the National Certificate on Education (NCE). Lecturers and instructors at the upper secondary and postsecondary non-tertiary education level need to attain a Bachelor's degree in education. In order to teach in polytechnics, lecturers must hold at least a Bachelor's degree (ISCED 6) or full professional qualifications in their disciplines. Instructors hold the Higher National Diploma, Advanced National Technical Certificate or equivalent qualifications (ISCED 5). At the tertiary education level, lecturers and instructors need to attain Bachelor's and Master's Degrees in Education (ISCED 6-7). A technologist is a Higher National Diploma certificate holder in charge of laboratories/workshops in the institutions.

Colleges of Education (technical), teacher training colleges, polytechnics (Edu-techs), and universities offer pre-service training for TVET lecturers and instructors. TVET Institutions and the National Board for Technical Education (NBTE) offer in-service training for TVET lecturers and instructors training (Alimi et al., 2015).

Current Reforms and Policy Discussion

Recent key reforms regarding TVET include the establishment of more TVET institutions, the development of the Nigerian Skills Qualifications Framework (NSQF), and the introduction of ODFL/Flexible Skills in the institutions. Flexible Skills Development (FSD) is designed to improve the quality of teaching and learning using ICT tools; and to provide access to formal and non-formal education. FSD is a Commonwealth of Learning (CoL) initiative which employs a blend of capacity building methods including online training workshops and an online community of practice. ODFL (Open and Distance Flexible Learning) is a flexible and open approach to distance learning to promote access to the labour market (Okobia, 2015).

Challenges to Effective TVET in Nigeria

According to the National Board for Technical Education, TVET in Nigeria is facing the following challenges:

Gender inequality: Gender inequality in TVET has been a long-term problem in Nigeria. The majority of students who enroll in TVET programmes are males, with less than 40% of the total enrolment in TVET being females.

Inadequate infrastructure: Access to TVET is constrained by inadequate and obsolete infrastructure, as promising projects often fail even if they have good pedagogical schemes. There is a lack of practical laboratories, workshops and there are a limited number of lecture rooms. The inadequate infrastructure also hinders institutions' ability to catch up with the latest technical developments.

Financing: The issue of financing of TVET is a topic of key importance in Nigeria. Currently, the budgetary allocation to TVET institutions is barely sufficient for institutions to be sustainable. The share of budget remains low, even though there are indications that TVET students are better integrated into the labour market.

Capacity development for teachers and trainers: There is an inadequate provision for teacher training. As TVET institutions fail to equip teachers with corresponding qualifications and knowledge, these teachers and trainers also fail to teach students and pass on skills and knowledge fit for the present and future labour markets.

ICT in TVET: TVET has evolved from simply training skilled operators to training knowledgeable professionals. However, as institutions often have inadequate ICT facilities to integrate e-learning, TVET institutions find it hard to improve the quality of teaching and learning outcomes.

2.2.2 Motor Vehicle Mechanics Work (MVMW) Programme in Technical Colleges in Nigeria

In Nigeria, technical colleges produce craftsmen for various sectors of the economy and are regarded as the principal vocational institutions. It offers various mechanical trades among is

Motor Vehicle Mechanics (MVM). The program of Motor Vehicle Mechanics trade in Nigeria technical colleges is designed to produce competent auto-mechanics craftsmen for Nigeria technological and industrial development. According to National Board for Technical Education (NBTE, 2018), auto-mechanics craftsmen are expected to test, diagnose, service and completely repair any fault on the motor vehicle to the manufacturer's specification. For this to be achieved, a National curriculum is adopted in all technical colleges accredited by the NBTE.

The curriculum for motor vehicle mechanic work in the technical colleges is developed to offer a complete secondary school education in general education in additional to occupational area while the central purpose of motor vehicle mechanic work trade is to provide its recipient with the skill required for work in the automobile industry. With technological advancement, computers are used to control virtually most operation in automobiles. Apart from the carburetor that has been replaced by Electronic Injection System, the ignition system has also witnessed changes from conventional point type with a magnetic pick-up coil to electronic ignition system (Offiong et al., 2016).

In a nutshell, technological development has brought several changes and modifications in automobile systems that are imported or assembled in this country. Within this context Okobia (2014) noted that an important issue of workforce development in Nigeria is to ensure that human resources are developed to such an extent that the achievement of desired rate of technological changes will not be impeded through lack of personnel with suitable skills. Thus, importation and the assemblage of automobiles with new technological devices in Nigeria have implications for workforce development in technical and vocational education.

The new technological development having implications for the work of auto-mechanics should be integrated into the skills contents and learning contents of the curriculum of technical education programs. Momo (2017) viewed that the production of craftsmen on motor vehicle mechanics by technical colleges should be based on the need of automobile industries; consequently, the curriculum contents should be directly related to what industries and business need to make graduates easily work in the industries. These called for curriculum contents that are directly related to the new technological development to be integrated into technical colleges' curriculum.

Audu et al. (2015) carried out a study to evaluate the quality of training received and its influence on job performance of technical college graduates in the industries in Benue State, Nigeria. The study was to find out the relevance and adequacy of curriculum contents for training the right skills in technical college graduates for self and industrial employment. 157 respondents comprise 50 technical college educators, 71 graduates of technical college and 36 employers of graduates from technical college and industries in Benue State, Nigeria. The finding of the study revealed that there was low rate of the degree of relevance of training in technical college curriculum content with the industrial skills for self and industrial employment (Audu et al., 2015).

However, technological developments in automobiles are changing day by day. The current curriculum is therefore said to be behind the state of art. It follows that the learning contents and skills that can be acquired through the curriculum must be short of adequate with some of them completely obsolete. It has equally resulted into a situation whereby the auto-mechanics craftsmen being produced in the technical colleges are without skills required for employment in the automobile industries thereby worsening the situation of unemployment in Nigeria. Based on this,

industries do not rely on the training giving to the graduates of the technical colleges rather any one employed must first be retrained before handling any repair. Most industries prefer craftsmen that have already acquired the necessary skills to test, diagnose, service and repair any automobile defect.

2.2.3 Skills and Benefit of Automobile Maintenance Skills to Craftsmen in Nigeria

Competitiveness of the automotive industry is critical to Nigeria's economic sustainability. Recent studies have shown that the automotive sector has consistently contributed over 3.8% to Nigeria annual gross domestic product (GDP) and as such, it is particularly imperative to support this sector, through growth-stimulating measures. Economic growth of any nation has long been attributed to the availability of resources, both tangible and intangible. Human capital is thus far the greatest intangible asset recorded in history and it is the key element upon which the success of all sectors is predicated. The availability of foreign direct investment (FDI) has largely been credited to the level of skilled and proficient human resources within an economy ((Nathaniel et al., 2019).

The automobile has brought about trade and skill acquisition in Nigeria, most especially the skill acquisition in assembling, maintenance and repairs of the automobile. Various system such as starting and lighting, braking and electronic ignition has provided skill and employment (Audu et al., 2015).

2.2.4 Electronic Ignition System

From a little spark may burst a flame" by Dante Alighieri, rightly said that a spark is required to start a flame and in automobile since there is a conversion of chemical energy (i.e. air-fuel mixture)

into mechanical energy i.e. (crankshaft rotation) spark is essential which is responsible for the combustion (Abwage, 2016).

In an internal combustion engine, combustion is a continuous cycle and occurs thousands times in a minute so an effective and accurate source of ignition is required. The idea of spark ignition came from a toy electric pistol that used electric spark to ignite a mixture of hydrogen and air to shoot a cork. The electronic ignition system is the type of ignition system that uses electronic circuits, usually by transistors controlled by sensors to generate electric pulses which in turn generate the better spark that can even burn the lean mixture and provide better economy and lower emission (Abuda, 2015).

The need for higher mileage, reduced emissions and greater reliability has led to the development of the electronic ignition system. This system still has a distributor, but the breaker points have been replaced with a pickup coil, and there's an electronic ignition control module.

Like conventional ignition systems, electronic systems have two circuits: a primary circuit and a secondary circuit. The entire secondary circuit is the same as in a conventional ignition system. In addition, the section of the primary circuit from the battery to the battery terminal at the coil is the same as in a conventional ignition system.

With the ignition switch turned on, primary (battery) current flows from the battery through the ignition switch to the coil primary windings. Primary current is turned on and off by the action of the armature as it revolves past the pickup coil or sensor. As each tooth of the armature nears the pickup coil, it creates a voltage that signals the electronic module to turn off the coil primary

current. A timing circuit in the module will turn the current on again after the coil field has collapsed. When the current is off, however, the magnetic field built up in the coil is allowed to collapse, which causes a high voltage in the secondary windings of the coil. It is now operating on the secondary ignition circuit, which is the same as in a conventional ignition system (Machief, 2016).

To understand the working of the electronic ignition system let's consider above figure in which all the components mentioned above are connected in their working order. When the driver switch ON the ignition switch in order to start a vehicle the current starts flowing from the battery through the ignition switch to the coil primary winding, which in turn starts the armature pickup coil to receives and send the voltage signals from the armature to the ignition module (Olaitan, 2015).

When the tooth of the rotating reluctor comes in front of the pickup coil as shown in the fig the voltage signal from pickup coil is sent to the electronic module which in turn senses the signal and stops the current to flow from primary coil. Similarly, when the tooth of the rotating reluctor goes away from the pickup coil, the change in voltage signal is sent by pickup coil to the ignition module and a timing circuit inside ignition module turns ON the current flow (Peter, 2016). A magnetic field is generated in the ignition coil due to this continuous make and break of the circuit which induced an EMF in secondary winding which increases the voltage up to 50000 Volts. This high voltage is then sent to distributor, which has the rotating rotor and distributor points which is set according to the ignition timing.

When the rotor comes in front of any of those distributor points, the jumping of voltage through the air gap from the rotor to the distributor point takes place, which is then sent to the adjacent spark plug terminal through the high tension cable. A voltage difference is generated between the central electrode and ground electrode, which is responsible for generating a spark at the tip of the spark plug and finally the combustion takes place.

2.2.5 skills needed by Motor Vehicle Mechanics Students in the Maintenance of Capacitive Discharge Ignition System

At present, many things have been changed because of technology. The researchers invented the CDI (Capacitive Discharge Ignition) system for SI (Spark Ignition) Engine using electronic ignition & contact point ignition. This system includes a pulse control circuit, spark plug, pulse generation circuit, main charge & discharge capacitor coil, etc. A Capacitive Discharge Ignition or CDI is an electronic ignition device that stores an electrical charge and then discharges it through an ignition coil in order to produce a powerful spark from the spark plugs in a petrol engine (Hiller & Coobes, 2014).

The short form of the Capacitive discharge ignition is CDI which is also known as thyristor ignition. It is one kind of automotive electronic ignition system, used in motorcycles, outboard motors, chainsaws, lawnmowers, turbine-powered aircraft, small engines, etc. It was mainly developed to conquer the long charging times which are connected through high inductance coils employed for IDI (inductive discharge ignition) systems to make the ignition system more appropriate for high engine speeds. The CDI utilizes capacitive discharge current toward the coil

for firing the spark plugs (Bestman, 2017). The following are skills needs of craftsmen for maintenance and repairs capacitive discharge ignition system (Bestman, 2017)

1. Proper fitting of transformer.
2. The use of standard coil in place of ignition transformer.
3. Skills on operating diagnostic and test equipments.
4. Performing visual, aural and functional assessment.
5. Assessing of present vehicle and equipment in a condition that complies with the work place requirement.
6. Determine the underlying causes of faults in the capacity discharge ignition system.
7. Disconnect wire to igniter and place jumper on ground module terminal.
8. Assessing Diagnostic Trouble Codes (DTCs).
9. Interpreting Diagnostic Trouble Codes (DTCs) when carrying out repairs in capacitive discharge ignition system.
10. Selecting appropriate equipment, materials, processes and procedure for capacitive ignition system.
11. Using appropriate equipment, materials process and procedure for capacitive discharge ignition system.
12. Replacing the blown fuse with a new fuse of the same colour and wattage.
13. Track starter circuit in vehicle, dismantle starter, check starter circuit components, repair the faults assemble.

14. Checking of circuit breaker and relay.
15. Testing to confirm that the fault has been rectified in the capacitive discharge ignition system.

2.2.6 Skills Needed by Motor Vehicle Mechanics Students in the Maintenance of Inductive Storage Ignition System

Haki and Ali (2015) stated that before embarking on any work it is necessary to know what it entails in order to avoid further complications. It is observed that most technicians, craftsmen and technologists are not familiar with practical skills needed in the maintenance of inductive storage ignition system. The following skills are needed in automobile technology in relations to inductive storage ignition system this includes:

1. Confirming if module is not locked out by turning appliance to a non-demanding position using the appropriate tools.
2. Identifying different electrical parts of Inductive Storage Ignition System.
3. Removing the field coil strap from the solenoid terminal using the appropriate tools.
4. Checking of circuit breakers and relays to determine their fault.
5. Testing alternator circuit voltage to ensure that it is working correctly.
6. Checking drop and trouble shooting in a charging system.
7. Dismantling alternators and components tests –diodes, rotor condition, rotor winding insulation and rotor condition with the appropriate tools.
8. Making joints on simple strapped conductors, sieving or taping with insulation tape.

9. Measuring conductor using wire gauge.
10. Soldering and crimping of lugs with wire ends.
11. Checking blown fuse with wires short-circulated.
12. Making sure burner supply line is not crimped or obstructed.
13. Checking the fault codes displayed after repair, reading intermittent fault.
14. Effective mounting of the inductive storage ignition system after maintenance and repair.
15. Testing to confirm that the reported faults has been rectified.

2.2.7 Skills Needed by Motor Vehicle Mechanics Students in the Maintenance and Repairs of Transistor Assisted Contact Ignition System

A variety of transistorized ignition systems are been proposed for use with an internal combustion engine such as the internal combustion engine used in an automobile. In this respect, it has been known for some time that with a transistorized ignition system a hotter spark across the electrodes of a spark plug can be obtained. A reduction in arcing across the breaker points in a distributor can be obtained, thereby reducing the maintenance normally required on the electrical ignition system of the automobile and a relatively constant output voltage across the secondary winding of the ignition coil at varying engine speeds (RPM). Particularly at relatively high engine speeds, can be obtained. Hence, adequate skill is required for the motor vehicle mechanics students to meet to this standard for the maintenance of the automobiles. The following are skills needed by motor vehicle mechanics students for maintenance of transistor assisted contact ignition system, William and Cook (2015):

1. Controlling the breaker points, for a correct setting as per the manufacturer's
2. Disconnecting already existing ignition condenser before repair.
3. The use of Supple leads of minimum1mm for connections.
4. Soldering four leads (connections 1, 2, 3 and 4) to the Printed Circuit Board (PCB) of the ignition system.
5. Proper keeping of the system in an appropriate position (boxed or insulated).
6. Ensuring no lead is misconnected or mixed up with one another.
7. Ability to verify good spark plugs from the bad ones.
8. Checking and maintenance of the status of the breaker points from getting burnt.
9. Cleaning of breaker points, with a cloth dipped in acetone, to remove the oil and dirt.
10. Proper checking and maintenance of spark plugs.
11. Using a new set of points before installing the transistor assisted contact ignition system.
12. Ability to back probe terminals connectors and fuse holders with appropriate test probes.
13. Changing of breaker points when required, most especially if resin take up to 50.000 km.
14. Probing terminal and connectors with appropriate test probes.
15. Testing to confirm that no other faults are present as a result of the repair action in the transistor assisted ignition system.

2.2.8 Strategies Involved in Acquiring the Needed Skill in the Maintenance of Electronic Ignition System

The Electrical Ignition System (EIS) is widest application for spark ignition internal combustion engines is in petrol (gasoline) road vehicles such as cars and motorcycles. The electronic ignition system works electrically without power from the crankshaft and as a result, it does not overload the performance of the engine, although require adequate maintenance and expert repairs (Audu et al., 2016). Automobile demand in Nigeria have continued to increase. Most especially brands and models of automobiles therefore abound today on the Nigerian roads, used for either public or convenience and luxury of personal transportation. Most of these vehicles uses electrical ignition system which must be serviced and properly maintained and repair as required in order to keep them in roadworthy conditions, prevent loss of lives and properties. Service personnel (craftsmen) must therefore be equipped with the relevant knowledge and skills for these purposes. The following are strategies revealed by researcher (Audu et al., 2016).

1. Carrying out demonstration in all practical activities involved in electronic ignition system maintenance
2. Employing learning and doing in teaching concept of electronic ignition system
3. Field trip/excursion to well established auto-electricity/electronics industries and workshops
4. Using discussion method in teaching electronic ignition system
5. Employing modeling in teaching various aspects of electronic ignition system to enable the learner to imitate

6. Role play to show steps in various aspects of electronic ignition system
7. Employing simulations in electronic ignition system in teaching the learners
8. Asking probing questions for teaching electronic ignition system
9. Encouraging students on workshop practice
10. Applying guided observation in practical lesson
11. Using discovery method in training of students in electronic ignition system
12. Learning by imitation enhance the students to learn all aspect of auto-electricity/electronic
13. Applying programmed learning in teaching electronic ignition system to the student
14. Encouraging individualized instructions in auto-electricity/electronics for slow learners
15. Involving and encouraging group discussion in small groups to ensure student participation in electronic ignition system maintenance practice

2.3 Review of Empirical Studies

Peter, et al. (2014) investigated into the Building craftsmanship skill development and Nigeria's vision 20:2020: Imperatives and Daunting Challenges. Nigeria's commitment to Improving the living standard of Its citizens has led to the Introduction of a long-term economic programme tagged vision 20:2020. The study seeks examine the current skill development efforts vis-a-vis the desired situations with a view to determining their capability to deliver the expected result. The study adopted quantitative and qualitative research methods, as data were sourced through literature search, Institutional records and structured questionnaire administered (both primary and secondary data) on 500 randomly selected master craftsmen in Ibadan. Data were analyse using

both descriptive and content analyse. Results show decline in the number of building apprentices and low enrolment of students in building, automobile related skills at the technical colleges and vocational centres of Nigerian Tertiary Institutions. The paper holds that for the nation to achieve its vision, drastic measures needed to be put in place. It concludes by highlighting some of these strategies such as; priority must be directed towards Improving the acquisition of skills related to technical education courses, given the important role of this sector in the socio-economic development of the country, also place great emphasis on improving access to microcredit schemes, financial business training. Business development services and market Information as a means of encouraging the youths to embrace building craftsmanship among others. The study is similar, to the present study with it's the purpose of examining the skill acquisition of craftsmen and it is conducted in Nigeria. However, the study those not examine the skill need by craftsmen on electrical ignition system in automobile which the present study does, the present only adopted a descriptive survey research design while the study adopted a mixed research design and finally, the research is conducted in different State in Nigeria.

Ogunmilade (2017) conducted a study on 'Core skills required by graduates of Motor Vehicle Mechanic Work for maintaining anti-lock braking system of modern cars in Lagos State'. The study was carried out to determine the core skills required by graduates of motor vehicle mechanic work for maintaining anti-lock braking system of modern cars in Lagos State. A survey research design was employed for the study. The population for the study comprised 204 supervisors in 68 registered automobile maintenance industries in Lagos State. A structured questionnaire item was used for collecting data from the respondents. The instrument was validated by three experts.

Cronbach alpha reliability method was employed to determine the internal consistency of the questionnaire items and 0.82 was obtained as reliability coefficient. Three research questions guided the study while three null hypotheses formulated were tested at 0.05 level of significance. Mean was used for answering research questions while t-test statistics was used to test the hypotheses of no significant difference at 0.05 levels of significance and 183 degree of freedom. It was found out that all the thirteen competencies in servicing, twenty-four competencies in repairing anti-lock braking system and ten safety competencies identified were required by graduates of MVMW for maintaining anti-lock braking system. It was recommended that all the maintenance-abilities or competencies identified in the study should be used to retrain the graduates of MVMW in Lagos State. It was also recommended that experts and specialists in ABS maintenance should be employed to train the graduates of MVMW. The study is also similar to the present study in terms of its purpose of study and research design adopted which is descriptive survey design). The study differs from the present study, in terms of the key aspect automobile in concern; as the study looks in to the repairs and maintenance of anti-lock braking system, while the present is investigating on the maintenance electronic ignition system and also the location where the research is being conducted differ from the present study.

Okwelle et al. (2017), also conducted a research on 'Technical Skills Needed by Motor Vehicle Mechanic Apprentice to Establish Standard Motor Mechanic Enterprise in Port Harcourt Metropolis, Rivers State'. The study adopted the descriptive survey research design. The sample of the study comprised 63 MVM artisans operating in MVM workshops in Ikoku Mechanic village

Diobu, Port Harcourt, who were purposively sampled. The instrument used for data collection was a structured questionnaire which was faced validated by three experts. The reliability of the instrument was established by using Cronbach Alpha reliability method to obtain the reliability coefficient was 0.86. Three research questions guided the study. Mean and standard deviation were used to answer the research questions. The study revealed modern technical skills in maintenance of ignition systems, carburetors as well as wheel alignment and balancing required by MVMW apprentice to qualify for graduation as MVM artisan and establish standard Motor Vehicle Mechanic enterprise in Port Harcourt metropolis. Based on the findings, recommendations were made among which included: Government should establish modern motor vehicle mechanic workshops that would train apprentice of MVM on technical skills required in maintaining and repairing of fuel system, ignition system and wheel alignment and balancing of motor vehicles wheels and tyres. The industries and motor vehicle companies should establish more service centres in Port Harcourt metropolis to train interested youths at subsidized rate. The study is found to be very similar to be present study in its purpose as well as the adoption of survey design approach, however the study differs to the present by not considering time overrun in its purpose, also the location as well target population. The study is also similar to the present study in terms of its purpose of study and research design adopted which is descriptive survey design). The study differs from the present study, in terms of the key aspect automobile in concern; as the study looks in to the repairs and maintenance of mechanical section of the automobile, while the present is investigating on the maintaining electronic ignition system and also the location where the research is being conducted differ from the present study.

Nathaniel et al. (2019) also assessed the Strategies for Enhancing Vocational Skills Acquisition by Students in Ignatius Ajuru University of Education, Rivers State. Two purposes, two research questions and two hypotheses guided the study. This study adopted a descriptive survey research design. The study was carried out in Ignatius Ajuru University of Education Rivers State. The population of the study was 101 respondents, comprising 45 female lecturers and 56 male lecturers in Ignatius Ajuru University of Education Rivers State. The entire population was used since the population is of manageable size. Thus, purposive sampling technique was used. A structured questionnaire instrument was used to collect data for the study. The instrument was face-validated by three experts. 30 copies of the questionnaires were administered among lecturers in Rivers State University; hence this did not form the part of the main population of the study. The Cronbach Alpha reliability coefficient formula was used to determine the reliability of the instrument. This yielded 0.68 reliability index. The finding of the study revealed that to a high extent would school/industry collaboration enhance Vocational Skills Acquisition by Students in Ignatius Ajuru University of Education, Rivers State. It was recommended that Government and policy makers should strengthen the Collaboration between schools and industries as this would enhance vocational skills acquisition by students. The study is found similar to the present study in terms of its purpose of study and research design adopted which is descriptive survey design). The study differs from the present study, as the reviewed study looks into only the strategies needed to improve skill need by vocational student on repairs and maintenance of automobile. The present is investigating the maintenance of electronic ignition system as well as the strategies to improve on

skills needed and also the location where the research is being conducted differ from the present study.

Similarly, Machief (2016) also conducted a study on Skills Improvement Needs of Automobile Technicians in Plateau State for Effective Maintenance of Modern Automobile. The great demand on the automobile industry to build more reliable, cleaner, safer and more fuel-efficient vehicles has greatly brought in a lot of technological innovations. The automobile technician therefore must keep up with these changes. Thus, the study was carried out to investigate the skills improvement needs of automobile technicians in Plateau State for effective maintenance of modern automobile. Survey research design was used for the study. The population for the study was 65 practicing automobile technicians and 14 lecturers/instructors from Federal College of Education (FCE) Pankshin and Plateau State Polytechnic (PSP) Barkin Ladi. A structured questionnaire was used as instrument for data collection. Cronbach alpha method was used to determine the reliability coefficient of the instrument, which yielded 0.85. Weighted mean and improvement needed index (INI) was used to analyse the data for answering the research questions while t-test statistic was used to test the hypotheses of no significant difference at 0.05 level of significance. It was found out that, automobile technicians need improvement in twenty-seven skills for servicing modern automobile engine and its support systems. Thirteen skills for diagnosing faults in modern automobile engine and its support systems, nine skills for repairing faults on modern automobile engine and its support systems. It was recommended that all the automobile technicians, lecturers, should be retrained on how to service, diagnose faults and repair all kinds of modern automobiles, it was also recommended that government and private individuals should donate modern tools and

equipment to automobile technicians in the study area. The study is found to be very similar to be present study in its purpose as well as the adoption of survey design approach, however the study differs to the present by not considering time overrun in its purpose, also the location as well target population. The study is also similar to the present study in terms of its purpose of study and research design adopted which is descriptive survey design). The study differ from the present study, in terms of the key aspect automobile in concern; as the study looks in to the general repairs and maintenance of mechanical section of the automobile, while the present is investigating on the

maintaining electronic ignition system and also the location where the research is being conducted differ from the present study.

2.4 Summary of Literature Review

The various concept regarding the Technical and Vocational Education and Training (TVET) programme, automobile and Craftsmen programme in Nigeria Technical Colleges in Nigeria, importance skills of automobile maintenance most especially of electronic ignition to Motor Vehicle Mechanics Students in Nigeria which are reviewed from various sources. The conceptual framework unveiled the invaluable importance as well scholarly concern on skill acquisition of Motor Vehicle Mechanic Students on automobile maintenance alongside some researcher findings, gives a direct and focus need for this study to investigate the skill acquisition needs of Motor Vehicle Mechanic Students for maintenance of Electronic Ignition System.

The theoretical section also gave insight on Adaptive control of thought model (ACT), Ackerman's model and Theory of Human Capital serve as theoretical background for the study. Also, the

reviewed empirical study has shown the trending research on automobile skills acquisition. Despite all these, very few research have been conducted on skill acquisition needs of motor vehicle mechanics students for the maintenance of electronic ignition system. The present study wanted to fill the gap by investigating into the skill acquisition needs of Motor Vehicle Mechanics Students in the maintenance of Electronic Ignition System.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

This chapter describes Research Design, Area of the Study, Population of the Study, Sample and Sampling Techniques, Research Instrument, Validity of the Instrument, Reliability of the Instrument, Method of Data Collection, and Method of Data Analysis.

3.1 Design of the Study

The research design adopted for the study was descriptive survey. Descriptive survey is a type of research survey that describes a population, situation, or phenomenon that is being studied. It focuses on answering the how, what, when, and where questions of a research problem, rather than the why (Fellows and Liu, 2013). This design was considered suitable because it enables the researcher to generate data through the standardized collection procedures based on highly structured research instrument(s) and related variables.

3.2 Area of the Study

The area of this study was Minna. Minna, the capital of Niger State is situated between latitude 09°36'45"N and longitude 06°31'12"E. Minna has a population of 291,905 as at 2006 population census count making it the biggest city in Niger State. Minna is about 135km away from the Federal Capital Territory and 300km away from Kaduna city. Within Niger State, Minna is about 86km away from Bida, 100km away from Suleja and about 130km from Kotangora by road. The town lies on a relatively high land with as light height between 240m-270m above sea level.

3.3 Population of the Study

The population of the study consists of eighty (80) Master Auto Electrician, seven (7) Automobile Technology Education Lecturers of College of Education Minna, six (6) Automobile Technology Education Lecturers of Federal University of Technology Minna, five (5) Automobile Technology lecturers of Minna Institute of Technology and Innovation and five(5) Automobile Teachers of Government Technical College Minna. Hence a total number of one hundred and three (103) population will be considered for the study. The study covers Minna only, because of high rate of insecurity challenges in the State and the Country at large.

3.4 Sample and Sampling Technique

Due to the relatively small size of the population, there was no need for sampling. Since the population was manageable, the entire population was used to carry out the study.

3.5 Instrument of Data Collection

A structured questionnaire “Skill Acquisition Needs of Motor Vehicle Mechanics Students the Maintenance of Electronic Ignition System” was used to elicit the desired data from the respondents. The questionnaire was divided into two parts (one and two). Part one requested for collection of information on personal data of respondents while Part two which consist of the sections (A - D), Section A addresses research question one, Section B addresses research question two, Section C addresses research question three and finally Section D addresses research question four.

The benchmark for decision making is calculated as follows:

$\frac{(\sum x_i)}{n} = \frac{(4+ 3 + 2 +1)}{4}$

$X = 10/ 4 = 2.5$

3.6 Validation of the Instrument

The designed questionnaire was validated by, three (3) experts from the Department of Industrial and Technology Education (ITE), Federal University of Technology Minna Niger State. Their inputs were used to improve the instrument before using it for the main study.

3.7 Reliability of the Instrument

The reliability of the research instrument was determined by using split half test using the odd and even numbered items to form the halves. The halves was administered to a sample of Motor Vehicle Mechanics Work (MVMW) teachers of Government Technical College Eyagi-Bida and Master Auto-Electricians in Bida since it was not selected for the main study. The conbach alpha test gives 0.87.

3.8 Method of Data Collection

The researcher collected the needed data through the use of questionnaire and its administration to Automobile teachers and lecturers in Minna Niger State. The administration of the questionnaire was carried out by the researcher and two other research assistant. A total of one hundred and three

(103) copies of the questionnaire was distributed to obtain responses from the lecturers teachers and master auto-electrician and retrieved on the spot by the researcher.

3.9 Method of Data Analysis

Responses from the respondent was analysed by computing the mean and T-test statistics. Mean

was used to answer the research questions while independent T-test will was used to test the hypotheses at 0.05 level of significance. Four-point rating scale was used for all the four-research question.

The decision rule of the research questions was based on the resulting mean scores from each item under each research question for the items under research question one, two and three, any item with the mean score of 2.50 and above was considered Needed (N) while any item with a mean score below 2.50 was considered Not Needed (NN). For the items under research question for, any item with a mean score of 2.50 and above was considered Agree(A) while any item with mean score below 2.50 was considered Disagree (D). Standard deviation was used to decide the closeness of the respondents to the mean of their responses.

The decision rule for the null hypotheses were based significant value on comparing the significant value with ($P< 0.05$) level of significant, that is where the significant value is less than ($P< 0.05$) it was rejected, while equal or greater than the ($P<0.05$) level of significant the null hypotheses were upheld and accepted.

CHAPTER FOUR

4. 0 RESULTS AND DISCUSSIONS

4.1Research Question One:

What are the skills needed by motor vehicle mechanics students in the maintenance of Capacitive Discharge Ignition system

Table 4.1: Mean response of automobile lecturers, technical teachers and master auto-electricians on the skills needed by motor vehicle mechanics students in the maintenance of capacitive ignition system.

S/N	ITEMS	XA1	SDA1	XA2	SDA2	XA	Remark
1	proper fitting of transformer	4.00	0.50	3.85	0.33	3.11	N
2	the use of standard coil in place of ignition transformer	4.00	0.49	3.98	0.51	3.21	N
3	skills on operating diagnostic and test equipment	4.00	0.67	3.44	0.40	3.33	N
4	performing visual aural and functional assessment	3.87	0.51	3.92	0.46	3.89	N
5	assessing of present vehicle and equipment in a condition that complies with the work place requirement	4.00	0.48	3.01	0.49	3.70	N
6	Determine the underlying causes of faults in the capacity discharge ignition system.	4.00	0.91	3.07	0.45	3.69	N
7	Disconnect wire to igniter and place jumper on ground module terminal.	4.00	0.49	3.33	0.30	3.94	N
8	Assessing Diagnostic Trouble Codes (DTCs).	4.00	0.77	3.51	0.38	3.39	N
9	Interpreting Diagnostic Trouble Codes (DTCs) Whencarrying out repairs in capacitive discharge ignition system.	3.53	0.60	3.53	0.42	3.03	N
10	Selecting appropriate equipment, materials, Processesand procedure for capacitive ignition system.	4.00	0.91	3.29	0.45	3.33	N
11	Using appropriate equipment, materials process and procedure for capacitive discharge ignition system.	3.93	0.42	3.01	0.55	3.47	N
12	Replacing the blown fuse with a new fuse of the Samecolor and wattage.	4.00	0.85	3.19	0.81	3.18	N
13	Track starter circuit in vehicle, dismantle starter, Checkstarter circuit components, repair the faults assemble.	3.92	0.35	3.36	0.65	3.14	N
14	Checking of circuit breaker and relay.	4.00	0.56	3.07	0.45	3.86	N
15	Testing to confirm that the fault has been rectified in the capacitive discharge ignition system	4.00	0.38	3.28	0.52	3.21	N
	Grand total	3.93	0.42	3.98	0.51		N

A1= Teachers/Lecturers, A2= Master auto electricians, SD= Standard Deviation, X=Mean, XAV= Average Mean and A= Agree.

Table 4.1 above shows the responses of teachers/lecturers and master auto electrician on the skills needed for the maintenance of capacitive discharge ignition system. The total mean of 3.93 and standard deviation 0.42 for teachers/lecturers and grand total mean 3.98 and standard deviation 0.51 for master auto electricians was obtained. The result implies that all items on skills are Sneeded by motor vehicle mechanics students in the maintenance of capacitive discharge ignition system.

4.2 Research Question Two:

What are the skills needed by motor vehicle mechanics students in the maintenance of Inductive Storage Ignition System?

Table 4.2: Mean response of automobile lecturers, technical teachers and master auto-electricians on the skills needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system.

S/N	ITEMS	XA1	SDA1	XA2	SDA2	XAV	Remark
1	Confirming if module is not locked out by turningappliance to a non-demanding position using the appropriate tools.	4.00	0.49	3.75	0.44	3.98	N
2	Identifying different electrical parts of Inductive Storage Ignition System.	3.92	0.38	3.01	0.56	3.46	N
3	Removing the field coil strap from the solenoid terminal using the appropriate tools.	3.95	0.78	3.29	0.82	3.6	N
4	Checking of circuit breakers and relays to determine their fault.	4.00	0.49	4.00	0.85	4.00	N
5	Testing alternator circuit voltage to ensure that it is working correctly.	3.75	0.44	3.92	0.46	3.83	N
6	Checking drop and trouble shooting in a charging system.	4.00	0.49	4.00	0.49	4.00	N
7	Dismantling alternators and components tests diodes,rotor condition, rotor winding insulation and rotorcondition with the appropriate tools.	3.65	0.39	3.85	0.33	3.75	N
8	Making joints on simple strapped conductors,	4.000	0.49	4.00	0.85	4.00	N

	sieving ortaping with insulation tape.						
9	Measuring conductor using wire gauge.	4.00	0.49	4.00	0.85	4.00	N
10	Soldering and crimping of lugs with wire ends.	4.00	0.49	4.00	0.85	4.00	N
11	Checking blown fuse with wires short-circulated.	4.00	0.49	4.00	0.85	4.00	N
12	Making sure burner supply line is not crimped or obstructed.	4.00	0.49	4.00	0.85	4.00	N
13	Checking the fault codes displayed after repair, reading intermittent fault.	4.00	0.49	4.00	0.85	4.00	N
14	Effective mounting of the inductive storage ignition system after maintenance and repair.	4.00	0.49	3.77	0.46	3.98	N
15	Testing to confirm that the reported faults has been rectified.	4.00	0.49	3.63	0.62	3.01	N
	Grand total	3.89	0.46	3.96	0.54		N

A1= Teachers/Lecturers, A2= Master auto electricians, SD= Standard Deviation, X=Mean, XAV= Average Mean and A= Agree.

Table 4.2 above shows the responses of teachers/lecturers and master auto electrician on the skills needed by motor vehicle mechanics students for maintenance of inductive storage ignition system. The grand total mean of 3.89 and standard deviation 0.46 for teachers/lecturers and grand total mean 3.96 and standard deviation 0.54 for master auto electricians were obtained. The result implies that all items on skills are needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system.

4.3 ResearchQuestionThree:

What are the skills needed by motor vehicle mechanics students in the maintenance of Transistor Assisted Contact Ignition System?

Table 4.3: Mean response of automobile lecturers, technical teachers and master auto-electricians on the skills needed by motor vehicle mechanics students in the maintenance of transistor assisted contact ignition system.

S/N	ITEMS	XA1	SDA1	XA2	SDA2	XAV	Remark
1	Controlling the breaker points for a correct setting as per the manufacturer's specifications.	3.38	0.53	3.96	0.75	3.47	N

2	Disconnecting already existing ignition condenser before repair.	3.29	0.45	3.48	0.50	3.38	N
3	The use of Supple leads of minimum1mm for connections.	3.38	0.73	3.29	0.45	3.83	N
4	Soldering four leads (connections 1, 2, 3 and 4) to thePrinted Circuit Board (PCB) of the ignition system.	3.95	0.78	3.78	0.42	3.86	N
5	Proper keeping of the system in an appropriate position (boxed or insulated).	3.25	1.12	3.93	0.28	3.59	N
6	Ensuring no lead is misconnected or mixed up with Oneanother.	3.53	0.56	3.67	0.45	3.62	N
7	Ability to verify good spark plugs from the bad ones.	3.23	0.72	3.01	0.56	3.62	N
8	Checking and maintenance of the status of the breaker points from getting burnt.	3.66	0.48	2.01	0.75	3.33	N
9	Cleaning of breaker points, with a cloth dipped in acetone, to remove the oil and dirts.	3.63	0.62	3.89	0.88	0.88	N
10	Proper checking and maintenance of spark plugs.	3.06	0.43	3.56	0.70	3.31	N
11	Using a new set of points before installing the transistor assisted contact ignition system.	3.88	0.99	3.72	0.45	3.30	N
12	Ability to back probe terminals connectors and fuse holders with appropriate test probes.	3.21	0.49	3.89	0.88	3.65	N
13	Changing of breaker points when required, most especially if resin take up to 50.000 km	3.01	0.49	3.75	0.44	3.38	N
14	Probing terminal and connectors with appropriate TestProbes.	3.54	0.43	3.03	0.32	3.78	N
15	Testing to confirm that no other faults are present as a resultof the repair action in the transistor assisted ignition system.	3.73	0.54	3.34	0.29	3.53	N
	Grand total	3.98	0.48	3.78	0.61		N

A1= Teachers/Lecturers, A2= Master auto electricians, SD= Standard Deviation, X=Mean , XAV= Average Mean and A= Agree.

Table 4.3 above shows the responses of teachers/lecturers and master auto electrician on the skills needed by motor vehicle mechanics students for maintenance of inductive storage ignition system. system. The grand total mean of 3.89 and standard deviation 0.46 for teachers/lecturers and grand total mean 3.96 and standard deviation 0.54 for master auto electricians were obtained The result implies that all items on skills are needed by motor vehicle mechanics students in the maintenance of transistor assisted contact ignition.

4.4 Research Question Four:

What are the strategies involved in acquiring the needed skill in the maintenance of Electronic Ignition System?

Table 4.4: Mean response of automobile lecturers, technical teachers and master auto-electricians on the strategies involved in acquiring the needed skill in the maintenance of electronic ignition system.

S/N	ITEMS	XA1	SDA1	XA2	SDA2	XAV	Remark
1	Carrying out demonstration in all practical activities involved in electronic ignition system maintenance	4.00	0.49	3.78	0.45	3.97	A
2	Employing learning and doing in teaching concept of electronic ignition system	4.00	0.49	3.63	0.49	3.10	A
3	Field trip/excursion to well established auto-electricity/electronics industries and workshops	4.00	0.49	3.22	0.67	3.35	A
4	Using discussion method in teaching electronic ignition system	3.55	0.62	3.54	0.43	3.54	A
5	Employing modeling in teaching various aspects of electronic ignition system to enable the learner to imitate	3.46	0.49	3.51	0.38	3.48	A
6	Role play to show steps in various aspects of electronic ignition system	3.31	0.53	3.93	0.78	3.12	A
7	Employing simulations in electronic ignition system in teaching the learners	3.36	0.65	3.66	0.48	3.51	A
8	Asking probing questions for teaching electronic ignition system	3.44	0.40	3.69	0.46	3.06	A
9	Encouraging students on workshop practice	3.54	0.50	3.93	0.28	3.23	A
10	Applying guided observation in practical lesson	3.30	0.72	3.53	0.56	3.91	A
11	Using discovery method in training of students in electronic ignition system	4.00	0.49	3.31	0.60	3.35	A
12	Learning by imitation enhance the students to learn all aspect of auto-electricity/electronics	3.37	0.53	3.27	0.99	3.32	A
13	Applying programmed learning in teaching electronic ignition system to the student	3.45	0.49	3.34	0.52	3.89	A
14	Encouraging individualized instructions in auto-electricity/electronics for slow learners	3.29	0.45	3.96	0.75	3.12	A
15	Involving and encouraging group discussion in small groups to ensure student participation in electronic ignitionsystem maintenance practice	3.41	0.49	3.21	0.65	3.31	A
	Grand total	3.85	0.35	3.85	0.54		A

A1= Teachers/Lecturers, A2= Master auto electricians, SD= Standard Deviation, X=Mean , XAV= Average Mean and A= Agree.

Table 4.4 above shows the responses of teachers/lecturers and master auto electrician on the strategies involved in acquiring the needed skill for the maintenance of electronic ignition system.. The grand total mean of 3.85 and standard deviation 0.35 for teachers/lecturers and grand total mean 3.85 and standard deviation 0.54 for master auto electricians were obtained. The result implies that all the items are strategies involved in acquiring the needed skills in the maintenance of electronic ignition system

4.5 Hypothesis One:

$H_{01:}$ There is no significant difference in the mean response of automobile teachers/lecturers and master auto electricians on the skill needed in the maintenance of capacitive discharge ignition system.

Table 4.5: Summary of t-test analysis for differences in the mean response of automobile teachers/lecturers and master auto electricians on the skill needed by motor vehicle mechanics students in the maintenance of capacitive discharge ignition system.

Teacher	N	Mean	SD	df	p	t-value	Decision
Lecturer	23	3.93	0.42	101	0.86	1.69	NS
Master auto electricians	80	3.98	0.51				

The data in Table 4.5 shows the test for significant difference in mean response of automobile teachers/lecturers and auto-electricians on the skill needed for the maintenance of capacitive discharge ignition system. The result revealed that p- value of 0.86 was obtained at 0.05 level of

significance and 101 degree of difference for the 15 items (research question one) with t-test value (1.69), the p (0.86) > 0.05 indicate that null hypothesis will not be rejected for this items. This shows that there is no significant mean response of automobile teachers/lecturers and master auto-electricians on the skill acquisition needs of motor vehicle mechanics students in the maintenance of capacitive discharge ignition system.

4.6 Hypothesis Two

$H_{02:}$ There is no significant difference in the mean response of automobile teachers/lecturers and master auto electricians on the skill needed in the maintenance of inductive storage ignition system

Table 4.6: Summary of t-test analysis for differences in the mean response of automobile teachers/lecturers and master auto electricians on the skill needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system

Teacher	N	Mean	SD	df	p	t-value	Decision
Lecturer	23	3.89	0.46	101	0.78	2.67	NS
Master auto electricians	80	3.96	0.56				

Result in Table 4.6 above unveils the test for significant differences in mean response of automobile teachers/lecturers and master auto electricians on the skill needed by motor vehicle mechanics students for the maintenance of inductive storage ignition system. The result shows that the significance value of 0.78 was obtained at 0.05 level of significance and 101 degree of freedom for the 15 items (research question two) with the t-value 2.67. Since p is (2.67) the null hypothesis is therefore not rejected for these items. This implies that a significant difference does not exist

between automobile teachers/lecturers and master auto electrician son the skill needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system.

4.7 Hypothesis Three

$H_{03:}$ There is no significant difference in the mean response of automobile teachers/lecturers and master auto electricians on the skill needed in the maintenance of transistor assisted contact ignition system.

Table 4.7: Summary of t-test analysis for difference in the mean response of automobile teachers/lecturers and master auto electricians on the skill needed in the maintenance of transistor assisted contact ignition system.

Teacher	N	Mean	SD	df	p	t-value	Decision
Lecturer	23	3.98	0.48				
				101	0.79	2.23	NS
Master auto electricians	80	3.78	0.61				

Result 4.7: above unveils the test for significant difference in mean response of automobile teachers/lecturers and master auto electricians on the skill needed by motor vehicle mechanics students for the maintenance of transistor assisted contact ignition system. The result shows that the significance value of 0.79 was obtained at 0.05 level of significance and 101 degree of freedom for the 15 items (research question three) with the t-table 2.23. Since p is (0.27) the null hypothesis is therefore not rejected for these items. This implies that a significant difference does not exist between automobile teachers/lecturers and master auto electricians on the skill needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system.

4.8 Findings of the Study

1. The findings of the study on research question one shows that all the items on skills are needed by motor vehicle mechanics students in the maintenance of capacitive discharge ignition system with average mean ranging from 3.93 to 3.98.
2. The findings of the study on research question two shows that all the items on skills are needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system with the average mean ranging from 3.89 to 3.96.
3. The findings of the study on research question three shows that all the items on skills are needed by motor vehicle mechanics students in the maintenance of transistor assisted contact ignition system with the average mean ranging from 3.78 to 3.98.
4. The findings of the study on the research question four shows that items are strategies involved in acquiring the needed skills in the maintenance and repairs of Electronic Ignition System with the average mean of 3.85.
5. The findings on hypothesis one shows that there is no significant difference in the mean response of automobile teachers/lecturers and master auto electricians on the skills needed by motor vehicle mechanics students in the maintenance of capacitive discharge ignition system.
6. The findings on hypothesis two shows that there is a no significant difference in the mean response of automobile teachers/lecturers and master auto electricians on the skills needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system.

7. The findings on hypothesis three shows that there is no significant difference in the mean response of automobile teachers/lecturers and master auto electricians on the skills needed in maintenance of transistor assisted contact ignition system.

4.9 Discussion of Findings

1. **What are the skills needed by motor vehicle mechanics students in the maintenance of Capacitive Discharge Ignition system?**

The findings of the study revealed that proper fitting of transformer, performing visual, aural and functional assessment, checking of circuit breaker and relay and assessing diagnostic trouble codes, interpreting diagnostic trouble codes, replacing blown fuse with new fuse, track starter circuit in vehicle, dismantle starter and check starter circuit component and repair the faults assemble. The Findings is in line with Thomas (2013) which stated that with the rapid advancement in technology, the mechanics job has evolved from purely mechanical to include electronic technology, because vehicles today possess complex computer and electronic system, mechanics need to have a broader base of knowledge than in the past. Skills on diagnostic and test equipment are needed, using appropriate equipment, materials process and procedures in capacitive discharge ignition system are skills needed by motor vehicle mechanics students in the maintenance of capacitive discharge ignition system. The findings is in line with the position of Giri (2015) that the electronic ignition system is among the main components of motor vehicle that require technicality as it ON and OFF the motor vehicle, hence expected to be holistically monitored and repaired once fault are developed, replace faulty electronic ignition components and inspect the capacitive

discharge ignition system thoroughly application and use of standard coil in place of ignition transformer.

2. **What are the skills needed by motor vehicle mechanics students in the maintenance of Inductive Storage Ignition System?**

The findings emanated from the study revealed that checking of circuit breakers and relays to determine their faults, testing alternator circuit voltage to ensure that it is working correctly, soldering and crimping of lugs with wire gauge, measuring conductor using wire gauge are some needed skills. The study is in line with Okwelle et al.. (2017) that replacing faulty electronic ignition components, use of multimeter to check voltage supply, inspection of throttle cable and adjusting where the needs arises, are the technical skills required by motor vehicle mechanic artisans in repairing and maintaining the ignition system which would guarantee the establishment of standard motor vehicle enterprise that will provide solution to various mechanical faults of motor vehicle operating in Port Harcourt metropolis. Measuring conductor using wire gauge, checking drop and trouble shooting in a charging system, dismantling alternators and components test- diodes, making sure burner is not crimped, checking the fault code display after repair are skills needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system.

3. **What are the skills needed by motor vehicle mechanics students in the maintenance of Transistor Assisted Contact Ignition System?**

The findings revealed the skills needed by motor vehicle mechanics students in the maintenance of transistor assisted ignition system. The result revealed the mean and standard deviation of the

responses of automobile teachers/lecturers and the master auto electrician; controlling the breaker points for a correct setting as per the manufacturer's specifications, disconnecting already existing ignition condenser before repair, the use of Supple leads of minimum1mm for connections, soldering four leads (connections 1, 2, 3 and 4) to the Printed Circuit Board (PCB) of the ignition system. Proper keeping of the system in an appropriate position (boxed or insulated), ensuring no lead is misconnected or mixed up with one another, ability to verify good spark plugs from the bad ones, checking and maintenance of the status of the breaker points from getting burnt, cleaning of breaker points, with a cloth dipped in acetone, to remove the oil and dirt, proper checking and maintenance of spark plugs,using a new set of points before installing the transistor assisted contact ignition system, ability to back probe terminals connectors and fuse holders with appropriate test probes, changing of breaker points when required, most especially if resin take up to 50.000 km, Probing terminal and connectors with appropriate test probes and testing to confirm that no other faults are present as a result of the repair action in the transistor assisted ignition system. The findings is in line with Denton (2004) that the procedure for charging maintenance to include loosen battery terminals, loosen the alternator clip to removing the alternator, dismantling it and rectifying the faults.

4. **What are the strategies involved in acquiring the needed skill in the maintenance of Electronic Ignition System?**

The findings also revealed the strategies involved in acquiring the needed skill for maintenance of electronic ignition system. The result revealed the mean and standard deviation of the responses of automobile teachers/lecturers and master auto electricians. The following are strategies involved

in acquiring needed skills in maintenance of electronic ignition system; employing learning and doing in teaching concept of electronic ignition system, field trip/excursion to well established auto-electricity/electronics industries and workshops. The findings of the study is in agreement with Umar and Ma'aji (2011) that potentials of students are developed with the use of different teaching strategies such as demonstration, simulation, role play among others for manipulation of workshop tools and equipment. Using discussion method in teaching electronic ignition system, employing modeling in teaching various aspects of electronic ignition system to enable the learner to imitate, role play to show steps in various aspects of electronic ignition system. Employing simulations in electronic ignition system in teaching the learners, asking probing questions for teaching electronic ignition system. Encouraging students on workshop practices, applying guided observation in practical lesson, using discovery method in training of students in electronic ignition system, learning by imitation enhance the students to learn all aspect of auto-electricity/electronics, applying programmed learning in teaching electronic ignition system to the student, encouraging individualized instructions in auto-electricity/electronics for slow learners, involving and encouraging group discussion in small groups to ensure student participation in electronic ignition system maintenance practice with average mean > 2.50. The findings of the study is in line with Mohammed (2008) that for effective skills acquisition in auto-mechanics the use of diagnostic tools and relevant facilities and equipment should be emphasized to increase students practical knowledge.

5. Hypothesis 1

The findings on the hypothesis one reveals the test for significant difference in the mean response of automobile teachers/lecturers and auto-electricians on the skill needed in the maintenance of capacitive discharge ignition system. The result revealed that p- value of 0.73 was obtained at 0.05 level of significance and 140 degree of difference for the 15 items (research question one) with t-test value (2.30), the p (0.73) > 0.05 indicate that null hypothesis will not be rejected for this items. This shows that there is no significant mean response of automobile teachers/lecturers and master auto-electricians in theskill acquisition needs of motor vehicle mechanics students in maintenance of capacitive discharge ignition system. The findings is in line with Idris and Ogbunaya (2015) that Advance technology have rendered most of the traditional skills inadequate for the world of work

6. Hypothesis 2

The findings on the hypothesis two unveils the test for significant differences in mean response of automobile teachers/lecturers and master auto electricians on the skill needed by motor vehicle mechanics students for the maintenance of inductive storage ignition system. The result shows that the significance value of 0.23 was obtained at 0.05 level of significance and 141 degree of freedom for the 15 items (research question two) with the t-table 0.75. Since p is (0.25) the null hypothesis is therefore not rejected for these items. This implies that a significant difference does not exist between automobile teachers/lecturers and master auto electricians on the skill needed by motor vehicle mechanics students in the maintenance of inductive storage ignition system.

7. Hypothesis 3

Finally the findings on hypothesis three shows that p- value of 0.41 was obtained at 0.05 level of significance and 141 degree of freedom of the 15 items (research question four) with the t-table value of 1.55. Since p is (0.41); the null hypothesis is therefore not rejected for these items. This implies that a significant difference does not exist between automobile teachers/lecturers and master auto electricians in the strategies involved in acquiring the needed skill in maintenance of Electronic Ignition System.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMEDATIONS

5.1 Summary of the Study

The study was carried out to identify the skill acquisition needs of motor vehicle mechanics students in the maintenance of electronic ignition system. The study was structured into five chapters.

Chapter One dealt with the background to the study where statement of the problem for this study was presented. Objectives, research questions and hypotheses were raised. Significance and scope of the study were presented. Chapter Two covers the review of related studies, where numerous materials were assessed such as TVET programme in Nigeria, MVMW Programme in Technical Colleges in Nigeria, skills and benefit of Automobile maintenance skills to craftsmen in Nigeria, Theoretical literature and several empirical studies were also reviewed.

Chapter Three presents the methodology used to carry out this study. Survey design, the research study was carried out in Minna, Niger State. The population targeted for the study were Three (3) Tertiary Institution and Government Technical College Minna due to high rate of insecurity challenges in Minna and the Nation at large. A total of One hundred and three (103) respondents; Eighteen(18) automobile technology lecturers, Five(5) Motor vehicle mechanics works teachers and Eighty (80) master auto electricians were selected. Questionnaire was the instrument used for data collection.

Chapter four presents result and discussion. Data collected were statistically analysed and result presented in a tabular form. The research questions answered were analysed using Mean and standard deviation, while t-test statistics was used to test the null hypotheses that was formulated for study. Summary of the findings and discussion were presented. The three null hypotheses stated were retained.

Finally, chapter five presents summary of the study, where each chapter discussed were summarized in detail. Implications of the study was presented based on the findings, conclusion is presented based on the findings and recommendations were also made for, Motor Vehicle Mechanics Students, teachers/Lecturer, Auto electrician, Automobile companies and National Board for Technical Education who are involved in Automobile technology.

5.2 Conclusion

Motor Vehicle Mechanics Work (MVMW) has been taught in different forms and with different motives. A focus in Technology education should be on infrastructural development and technological advancement and thus should be viewed as fundamentally critical. Its duty is to prepare young students and even adults to engage positively and meaningfully with their environments and the world to build a formidable and durable scientific culture, industrialization and a robust economy. The Federal and State Ministries of education, stakeholders and other relevant authorities in education should develop in Technology a pedagogical methodology that consists of the raising of scientific awareness, the nurturing of scientific passion and engagement in technological skill.

5.3 Implications of the Finding

The findings of this study have implications for the Government, National Board of Technical Education, Teachers and Lecturers of Automobile Technology. The National Board of Technical Board could use the identified skills to update the pedagogy and components of the curriculum for automobile technology in tertiary institutions and the technical colleges.

Motor Vehicle Mechanics Work (MVMW) Teachers and Automobile Lecturers will be able to identify adequate teaching methods that will be used to acquire the needed skills and experiences in maintenance of Electronic Ignition system.

5.4 Recommendations

Based on the findings of the study, the following recommendations were made:

1. Motor vehicle mechanics works Teachers in technical colleges should teach students the skills needed in the maintenance of capacitive discharge ignition system.
2. Automobile teachers and lecturers should teach students the skills needed in the maintenance of inductive storage ignition system.
3. The skills needed in the maintenance of transistor assisted contact ignition system should be included in the curriculum so that students can be equipped with the necessary skills.
4. Automobile teachers and lecturers should adopt the use of the strategies involved in acquiring the needed skill in thes maintenance of electronic ignition system when teaching.

5.5 Suggestion for Further Research

The following suggestions were made for future research studies.

1. Factors contributing to poor skill acquisition of motor vehicle mechanics students in the maintenance of electronic ignition system
2. Teachers' factors contributing to the skill acquisition of motor vehicle mechanics students for the maintenance of electronic ignition system.

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APPENDIX A

LETTER TO THE RESPONDENTS

Department of Industrial and TechnologyEducation,

Federal University of Technology, Minna,

Niger State.

Dear Respondent,

I am an undergraduate student of Industrial and Technology Education in the above named University. I am presently conducting research on "Skill Acquisition Needs of Motor Mechanics Students in the Maintenance of Electronic Ignition System." The questionnaire is designed as part of the study to collect relevant information for a successful completion of this research.

Please kindly provide response to these questions, I assure you that it will purely be used for academic purpose alone.

Thank you for your anticipated cooperation.

Yours sincerely,

Fatunbi, Tobi Johana

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Automobile Technology Option

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APPENDIX B

QUESTIONNAIRE

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION

DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION

QUESTIONNAIRE FOR THE SKILL ACQUISITION NEEDS OF MOTOR VEHICLE MECHANICS STUDENTS IN THE MAINTENANCE OF ELECTRONIC IGNITION SYSTEM

SECTION A

Introduction: This questionnaire is meant to assess the skill acquisition needs of motor vehicle mechanics students in maintenance of electronic ignition system.

Instruction: Please kindly tick the column that best appeals to your opinion on the items. All Information provided will be highly confidential and strictly used for the purpose of this research.

Motor Vehicle Mechanics Work (MVMW) Teachers ( )

Automobile Technology Lecturers ( )

Master Auto Electrician ( )

A four (4) point rating scale is used to indicate your opinion as stated below:

Highly Needed (HN)	Strongly Agree (SA)	4 points
Needed (N)	Agree (A)	3 points
Moderately Needed (MN)	Disagree (D)	2 points
Not Needed (NN)	Strongly Disagree (SD)	1 point

SECTION B

Research Question One:

What are the skills needed by motor vehicle mechanics students in the maintenance of Capacitive Discharge Ignition System?

S/N	ITEMS	HN (4)	N (3)	MN (2)	NN (1)
1	Proper fitting of transformer.				
2	The use of standard coil in place of ignition transformer.				
3	Skills on operating diagnostic and test equipment.				
4	Performing visual, aural and functional assessment.				
5	Assessing of present vehicle and equipment in a condition that complies with the work place requirement.				
6	Determine the underlying causes of faults in the capacity discharge ignition system.				
7	Disconnect wire to igniter and place jumper on ground module terminal.				
8	Assessing Diagnostic Trouble Codes (DTCs).				
9	Interpreting Diagnostic Trouble Codes (DTCs) when carrying out repairs in capacitive discharge ignition system.				
10	Selecting appropriate equipment, materials, processes and procedure for capacitive ignition system.				
11	Using appropriate equipment, materials process and procedure for capacitive discharge ignition system.				
12	Replacing the blown fuse with a new fuse of the same colour and wattage.				
13	Track starter circuit in vehicle, dismantle starter, check starter circuit components, repair the faults assemble.				
14	Checking of circuit breaker and relay.				
15	Testing to confirm that the fault has been rectified in the capacitive discharge ignition system.				

Research Question Two:

What are the skills needed by motor vehicle mechanics students in the maintenance of Inductive Storage Ignition System?

S/N	ITEMS	HN (4)	N (3)	MN (2)	NN (1)
1	Confirming if module is not locked out by turning appliance to a non-demanding position using the appropriate tools.				
2	Identifying different electrical parts of Inductive Storage Ignition System.				
3	Removing the field coil strap from the solenoid terminal using the appropriate tools.				
4	Checking of circuit breakers and relays to determine their fault.				
5	Testing alternator circuit voltage to ensure that it is working correctly.				
6	Checking drop and trouble shooting in a charging system.				
7	Dismantling alternators and components tests –diodes, rotor condition, rotor winding insulation and rotor condition with the appropriate tools.				
8	Making joints on simple strapped conductors, sieving or taping with insulation tape.				
9	Measuring conductor using wire gauge.				
10	Soldering and crimping of lugs with wire ends.				
11	Checking blown fuse with wires short-circulated.				
12	Making sure burner supply line is not crimped or obstructed.				
13	Checking the fault codes displayed after repair, reading intermittent fault.				
14	Effective mounting of the inductive storage ignition system after maintenance and repair.				
15	Testing to confirm that the reported faults has been rectified.				

Research Question Three:

What are the skills needed by motor vehicle mechanics students in the maintenance of Transistor Assisted Contact Ignition System?

S/N	ITEMS	HN (4)	N (3)	MN (2)	NN (1)
1	Confirming the breaker points for a correct setting as per the manufacturer's specifications.				
2	Controlling Disconnecting already existing ignition condenser before repair.				
3	The use of Supple leads of minimum1mm for connections.				
4	Soldering four leads (connections 1, 2, 3 and 4) to the Printed Circuit Board (PCB) of the ignition system.				
5	Proper keeping of the system in an appropriate position (boxed or insulated).				
6	Ensuring no lead is misconnected or mixed up with one another.				
7	Ability to verify good spark plugs from the bad ones. .				
8	Checking and maintenance of the status of the breaker points from getting burnt.				
9	Cleaning of breaker points, with a cloth dipped in acetone, to remove the oil and dirts.				
10	Proper checking and maintenance of spark plugs.				
11	Using a new set of points before installing the transistor assisted contact ignition system.				
12	Ability to back probe terminals connectors and fuse holders with appropriate test probes.				
13	Changing of breaker points when required, most especially if resin take up to 50.000 km.				
14	Probing terminal and connectors with appropriate test Probes.				
15	Testing to confirm that no other faults are present as a result of the repair action in the transistor assisted ignition system.				

Research Question Four:

What are the strategies involved in acquiring the needed skill in the maintenance of Electronic Ignition System?

S/N	ITEMS	SA (4)	A (3)	D (2)	SD (1)
1	Carrying out demonstration in all practical activities involved in electronic ignition system maintenance				
2	Employing learning and doing in teaching concept of electronic ignition system				
3	Field trip/excursion to well established auto-electricity/electronics industries and workshops				
4	Using discussion method in teaching electronic ignition system				
5	Employing modeling in teaching various aspects of electronic ignition system to enable the learner to imitate				
6	Role play to show steps in various aspects of electronic ignition system				
7	Employing simulations in electronic ignition system in teaching the learners				
8	Asking probing questions for teaching electronic ignition system				
9	Encouraging students on workshop practice				
10	Applying guided observation in practical lesson				
11	Using discovery method in training of students in electronic ignition system				
12	Learning by imitation enhance the students to learn all aspect of auto-electricity/electronics				
13	Applying programmed learning in teaching electronic ignition system to the student				
14	Encouraging individualized instructions in auto-electricity/electronics for slow learners				
15	Involving and encouraging group discussion in small groups to ensure student participation in electronic ignition system maintenance practice				