

**THE OCCUPATIONAL AND EMPLOYABILITY COMPETENCIES NEEDS OF  
AUTOMOBILE ELECTRICAL SYSTEMS' TECHNICIANS**

***BY***

**MUSTAPHA ALIYU**

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**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION, FEDERAL  
UNIVERSITY OF TECHNOLOGY MINNA, NIGER STATE**

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**CERTIFICATION**

I Mustapha, Aliyu with the Matriculation Number of 2007/1/27295BT an undergraduate student of Industrial and Technology Education Department wishes to certify that the work embodied in this research project is original and has not been submitted in any part or full for any other Diploma or Degree programmes of this or any other University.

.....

**Name**

.....

**Sign-Date**

**APPROVAL PAGE**

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

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**Supervisor**

.....

**Signature & Date**

.....

**Head of Department**

.....

**Signature & Date**

.....

**External Examiner**

.....

**Signature & Date**

## **DEDICATION**

In deep reverence of my creator (Allah), the noblest prophet (Muhammad SAW), his household and those who follow and will continue to follow his footprint till the end of the universe.

## **ACKNOWLEDGMENT**

All praises, glorification, submission and devotion are due to Allah, the master of the universe. I beseech Allah to increase constantly and permanently His blessing on the last prophet (Muhammad SAW)

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### **Abstract**

This study was carried out to identify the occupational and employability competencies needs of Automobile Electrical Systems' Technicians. Specifically, this study determined:- the Occupational Competencies Needed by Automobile Electrical Systems' Technician in General automotive electrical system diagnosis, battery and charging system diagnosis and repair, starting system diagnosis and repair, lighting and accessories system diagnosis and repair and the general employability competencies. Five research questions were answered and three null hypotheses were formulated and tested at 0.05 level of significant to guide the study. Some related literatures were reviewed, among which are: Development of Automobile in Nigeria, the Occupational Competencies in Automobile Body and Electrical System, the Employability Competencies in Automobile Body and Electrical System, and the Methods of Teaching Employability Skills. The descriptive survey approach was used and the target population for this study was made up of Automobile Technicians, Automobile Teachers and Automobile Lecturers, within the selected areas in Niger State. Eighty-one (81) item-questionnaires were used as instruments for data collection which were analyzed according to research questions. The data collected from the respondents was analyzed using frequency count, mean and analysis of variance (ANOVA). The findings among others include: the practices of safe working habits in workshops, the proper use of hand tools, power tools, equipment and measuring instruments, establishing good rapport with subordinates, ability to write report, among others. It was recommended that there should be a review of the Automobile Electrical Systems' Technicians training programmes to ensure that they are competent and employable in the automobile and related industries; The roles, responsibilities, and ethical obligations of employees in the industry should be adequately communicated to the students during training; given the evolution of industrial and labour laws, there should be regular and systematic evaluation of teaching curricula, taking into account the industrial and employers' requirements.

# CHAPTER I

## INTRODUCTION

### **Background of the study**

Automobiles, self-propelled vehicles, are used primarily on public roads but adaptable to other surfaces. Automobiles are classified by size, style, number of doors, and intended uses. The typical automobile, also called a car, auto, motor car, and passenger car, has four wheels and can carry up to six people, including the driver. Larger vehicles, designed to carry more passengers are called vans, minivans, omnibuses, or simply buses. Those used to carry cargo are called pickups or trucks, depending on their sizes and designs. Minivans are van-style vehicles built on a passenger car frame that can usually carry up to eight passengers. Sport-utility vehicles, also known as SUVs, are more rugged than passenger cars and are designed for driving in mud or snow. (Encyclopedia, 2009)

The automobile is built around an engine. Various systems supply the engine with fuel, cool it during operation, lubricate its moving parts, and remove exhaust gases it creates. The engine produces mechanical power that is transmitted to the automobile's wheels through a drive train, which includes a transmission, one or more driveshafts, a differential gear, and axles. Suspension systems, which include springs and dampers (shock absorbers), cushion the ride and help protect the vehicle from being damaged by bumps, heavy loads, and other stresses. Wheels and tires support the vehicle on the roadway and, when rotated by powered axles, propel the vehicle forward or backward. Steering and braking systems provide control over direction and speed. An electrical system starts and operates the engine, monitors and controls many aspects of the vehicle's operation, and powers such components as headlights and radios. Safety features such as bumpers, air bags, and seat belts help protect occupants in an accident.

Today, electronic is a major part of the modern automobile. The automobile electrical systems are getting more and more intricate, and the need for professional care is becoming imperative. Electricity has been used for lighting and many other function including starting, battery charging and ignition. In addition to these fundamental systems, numerous auxiliary electrical systems are now fitted to provide safety and comfort aids for the driver and passengers of the vehicle. The battery, which is the electrical source when the engine is not running, is connected to a number of separate circuits such as the charging, starting, ignition fuel injection engine management, lighting and the auxiliary circuit (Hillier and Rogers, 2007).

Many problems associated with day-to-day driveability are caused by voltage variations and must be the first step in troubleshooting any problem. When any of problems is experienced, consultation at an automobile electrical system technicians is required for repairs.

Automobile electrical system technicians are set of technicians who use a wide range of tools to adjust, test, diagnose, service and completely repair any fault on the motor vehicle for safe and reliable operation according to the manufacturer's specification (NBTE, 2001). In small shops, they may work on a wide variety of repair jobs while in larger workshops, they may specialize in repairing, rebuilding and servicing the electrical section of the motor vechile. Automobile electrical system technicians begins a job by reading the work order and examining a motor vehicle to locate the cause of faulty operation and determine the appropriate repair using their sight, sound, feel and smell.

For an automobile electrical system technicians to be competent at work, he/ she needs some required skills. Skills can be define as the ability to do something well, usually gained through training or experience(Encyclopedia, 2009). Among the skills required are occupational and employability skills among others. Most young people leave school without the knowledge

or foundation required to find and retain a good job. Employers are not only looking for graduates with technical knowledge but among those with non technical abilities that is employability skills or those attributes of employees other than technical competence that makes them assets to the employer.

The assessment of Automobile electrical system technicians is undertaken based on two major technical competency test upon which all other considerations depend, viz:- Occupational and Employability skills. The occupational skills includes units of competency covering common skills and knowledge will be assesses with each of the competency groups. This unit relate to the work place occupational health and safety requirements, work processes and procedures. The employability skills assessment includes the following employability skills: team work, communication, problem solving, planning and organising, learning, technology, self management, initiative and enterprise.

Occupation is defined according the microsoft encyclopedia 2009, as the job by which somebody earns a living. The United Kingdom (UK) Training Agency (1988), defines occupational competency as the ability to perform the activities within an occupation or function to the standards expected in employment. This includes the ability to transfer skills and knowledge to new situations, organisation and planning of work, innovation and coping with non routine activities and the personal effectiveness to deal with co- workers, managers and customers. It stems from an understanding of the need to perform effectively in a work role in which an individual has to combine the performance of various technical and components. As well as the management of the various technical and task components to achieve the overall work function, management of the variance and unpredictability in the work role and wider

environment and integration of the work role within the context of the wider organisation, economic, market and social environment.

According to Sherer and Eadie (1987) employability skills are not job specific but are skills which cut across all industries and vertically across all jobs from entry level to chief executive officer. Employability can be distinguished from employment as education from training (Cox and King, 2006). It is the capability to acquire the necessary skills to do a task rather than having the necessary skills upon graduation without further training. These skills are also meant to describe the preparation or foundation skill upon which a person must build job specific skills like communication, personal and interpersonal relationships, problem solving and management of organisational processes. The 88th session of the International Labour conference held in 2000 adopted a resolution concerning human resources, training and development. This resolution defines employability skills as follows: it encompasses the skills, knowledge and competencies that enhance a worker's ability to secure and retain job, progress at work and cope with change, secure another job if he/ she so wishes or has been kind off and enter more easily into the labour market at different periods of the life cycle. Individuals are most employable when they have broad based education and training, basic and potable high level skills including Information Communication Technology (ICT) and communication language skills. This combination of skills enables them to adapt to changes in the field of work.

The employability has the following features: Broad- based education, acquisition of basic and potable high level skills, acquisition of knowledge and development of competencies.

It has the following as its attributes:

1. Basic skills which include oral communication (speaking and listening), reading especially understanding and following instruction, basic arithmetic and writing.



2. High order thinking skills which include problem solving, learning skill strategies, creative and innovative thinking and decision making.
3. Affective skills and traits which also include dependability/ responsibility, positive attitude towards work, punctuality, efficiency, working as a team member, self confidence, positive self image, adaptability, flexibility, enthusiam, motivation, and others.

Hence, the primary concern of employers lies in finding employees with a good work ethic and appropriate social behaviour. It is clear that the above reason are not related only to academic qualifications. Employers often look for other characteristics that is the employability skills.

According to Little, (2003) employability skills are set of achievements understanding and personal attributes that make individual more likely to gain employment and be successful in their occupations. Therefore, auto electricity technicians required both occupational and employability competencies that will enable them function in the 21<sup>st</sup> century worth environment.

### **Statement of the problem**

For many years, Occupational and Employability Competencies Needed by Automobile Electrical Systems' Technicians have been a topic of debate (Graham, Vitale and Schenk 1993). Employers have argued that students are often not adequately prepared for the workplace challenges as the graduate from their schools. Based on this argument, the universities have been charged to produce more employable graduates(Kember and Leung, 2005; Barrie, 2006). The graduate generic skills are perceived more important than technical skills by employers and valued over them (Cotton, 2001). In a major study conducted by Harvey and Geall (1977), graduate employability was identified as a major concern for employers. According to the report

from the United Kingdom (UK) Industry and Parliament Trust's Study group on employability, employers are not satisfied with quality of young people and graduates coming into the labour market (Clarke, 1997). It is often assumed that competency is all about being capable of gaining and sustaining fulfilling jobs. However, this common assumption does fail to stand the test of time because employers often realise afterwards that Occupational and Employability skills go beyond job acquisition. It extends to skills necessary to make progress on the job, guarantee the realisation of one's potentials as well as contribute meaningfully towards the achievement of organisational objectives of the employer. Department of Education and Training (DEST, 2002). Automobile Electrical Systems' Technicians are more susceptible to the erroneous assumption as they go into the field of work with little or no thought about the above extra- required Occupational and Employability skills which lead to dissatisfaction both on the part of the employee and employer.

The Occupational and Employability Competencies Needs of Automobile Electrical Systems' Technicians will entail a re-think in the development of appropriate curriculum for the technicians by the university authorities. Such a curriculum should incorporate interpersonal, communication and problem solving skills. Other requirements in this regard include team work spirit, intellectual initiatives and observance of ethical standards and others (Hind, 2007; Maher and Graves, 2007). This approach will certainly make graduates more employable and likely successful in their chosen careers which will be beneficial to the employer, the work place, the community and the national economy.

Therefore, if students are not prepared with the skills during training to meet the desperate needs and expectations of both the employers and employees at the workplace, they will not fit to work in any automobile or related industry, thereby creating unemployment among the graduates that are skill-handicapped in the field.

**Purpose of the study**

The main purpose of the study is to Identify the Occupational and Employability Competencies Needs of Automobile Electrical Systems' Technicians. Specifically, this study identified the:

1. Occupational competencies needed by automobile electrical systems' technician in general automotive electrical system diagnosis.
2. Occupational competencies needed by automobile electrical systems' technician in battery and charging system diagnosis and repair.
3. Occupational competencies needed by automobile electrical systems' technician in starting system diagnostic and repair.
4. Occupational competencies needed by automobile electrical systems' technician in lighting and accessories system diagnosis and repair.
5. The general employability competencies needed by automobile electrical systems' technicians.

**Significance of the study**

The findings of this research will be of immense benefit to the National Board for Technical Education (NBTE), managers and top executives of the organised sector of the national economy, automobile electrical technicians and the society at large.

The National Board for Technical Education (NBTE) will benefit from the research work in planning and reviewing the curriculum contents of the automobile technicians through the acquisition of skills to prepare them for the challenges of the automobile industry if published or use through paper presentation in the form of seminars, workshop, symposia, enlightmtnt forum

and kept in the library for consultation. Managers and top executives of the organised sector of the national economy will also benefit from the research work in policy formulation with regards to equipment specification for industries and employment criteria so as to enhance productivity.

The Automobile Systems' Technicians will also benefit from the research work by using the right tool as it goes a long way in reducing the risk of danger of accident and then minimizes damage of equipment or tools. Finally, the findings of the study will be of benefit to the society if adequately implemented as it will give the society competent workforce that will be able to maintain and repair electrical system of motor vehicles.

### **Scope of the Study**

This research work was delimited to the Identification of Occupational Competencies in the following areas: general automotive electrical system diagnosis, battery, charging and starting system and the general employability competencies needed by the Automobile Electrical Systems' Technicians.

### **Research question**

The study provides answers to the following questions:-

1. What are the occupational competencies needed by automobile electrical systems' technician in general automotive electrical system diagnosis?
2. What are the occupational competencies needed by automobile electrical systems' technician in battery and charging system diagnosis and repair?
3. What are the occupational competencies needed by automobile electrical systems' technician in starting system diagnostic and repair?

4. What are the occupational competencies needed by automobile electrical systems' technician in lighting and accessories system diagnosis and repair?
5. What are the general employability competencies needed by automobile electrical systems' technicians?

### **Assumption of the study**

The following assumptions were made to guide the design of the study:

1. That both the Automobile technicians, Automobile teachers and Automobile Lecturers have a satisfactory knowledge on the occupational and employability competencies needed in automobile electrical system, and therefore can respond adequately to the questionnaire items.
2. That the research assistant will assist in the facilitation and distribution of the questionnaire.

### **Hypothesis**

The following null hypotheses were formulated to guide the study and tested at 0.05 level of significance:

- HO<sub>1</sub> There is no significance difference between the mean responses of automobile technicians, automobile teachers and automobile lecturers on general automotive body electrical system diagnosis.
- HO<sub>2</sub> There is no significance difference between the mean responses of automobile technicians, automobile teachers and automobile lecturers on battery and charging system diagnosis and repair.

HO<sub>3</sub> There is no significance difference between the mean responses of automobile technicians, automobile teachers and automobile lecturers on the general employability competencies for automobile body electrical system.

## CHAPTER II

### REVIEW OF RELATED LITERATURE

In this chapter the review of the related literature was done based on the following headings:-

1. Development of Automobile in Nigeria.
2. Occupational Competencies in Automobile Body and Electrical System.
3. Employability Competencies in Automobile Body and Electrical System.
4. Methods of Teaching Employability Skills.
5. Summary of related literatures.

#### **Development of Automobile in Nigeria**

Generally, the history of automobile began as early as 1769, with the invention of steam engine automobiles. The automobile, was not invented in a single day by a single inventor. The history reflects an evolution that took place worldwide. It was estimated that over 100,000 patents invented the modern automobile. The men and women behind the invention of the modern automobiles include Karl Benz, the German mechanical engineer who designed and built the world's first practical automobile in 1885 and Henry Ford, who improved on the assembly line for automobile manufacturing and also invented a car transmission mechanism among others.

In 1769, a French engineer and mechanic, Nicolas Joseph Cugnot invented the first steam- powered vehicle which was later constructed by Brezin which was capable of attaining speeds up to 6km/hour. Two years later, he designed another faster steam- driven engine, which

was so fast that it rammed into a wall, recording the first car accident. These early steam-powered automobiles were so heavy that they were only operated on a perfectly flat and strong surface. However, impracticable as these automobiles seemed then, their designs were the basis of the first generation self-propelled vehicles or automobiles and consequently the basis of the design of the modern cars.

In Nigeria, the Nigerian Railway Corporation (NRC) began the training of its staff, especially the engine drivers, to introduce automobile transportation system in 1901. Other institutions that facilitated the introduction of automobiles in Nigeria include the Public Works Department of the Ministry of Works and Transport in 1931 and the Nigeria Ports Authority (NPA) in 1942. The Federal Military Government under the leadership of General Yakubu Gowon initiated plans to establish the Peugeot Automobile of Nigeria (PAN). The idea was concretized on October 6, 1969 when the Government invited sixteen (16) reputable vehicle manufacturing companies in the world to establish a vehicle assembly plant in the country.

Twelve years before the initiative, the Peugeot car made its first entry into Nigeria when individuals imported about 100 units of Peugeot 403 model into the country. These cars soon became popular due to their legendary reliability and suitability to Nigerian road conditions. The demand for Peugeot cars in Nigeria rose sharply again in the 1960s with the further introduction of Peugeot 404 model. With the high demand of Peugeot products, which was a mark of their popularity in Nigeria, it was not surprising that on May 7, 1971, the Federal Military Government accepted the proposal from Peugeot out of those tendered by sixteen vehicle manufacturers.

PAN Limited was incorporated on December 15, 1972 as Limited Liability Company. Twenty-seven months after incorporation, the then Head of State, General Yakubu Gowon,



commissioned the assembly plant on March 14, 1975 even though full operations had commenced on March 2, 1975.

### **Occupational Competencies In Automobile Electrical System.**

Occupation refers to the job by which somebody earns a living (Microsoft Encarta, 2009). The basic premise of an occupation is a type of work or job that may be found in a number of different types of work places or industries. Occupations focus on positions that require skills that may be used in a number of different work settings, allowing the individual with that skill set to move with relative ease from one industry to another as the need arises.

Competency is a set of defined behaviors that provides a structured guide enabling the identification, evaluation and development of the behaviors in individual employee. As defined, the term "competence" first appeared in an article authored by Craig C. Lundberg in 1970 titled "Planning The Executive Development Program". The term gained traction when in, 1973, David McClelland, Ph.D. wrote a seminal paper entitled, "Testing For Competence Rather Than For Intelligence". It has since been popularized by Mc Ber & Company Currently the "Hay Group" and many others. Some scholars see "competence" as a combination of knowledge, skills and behavior used to improve performance or as the state or quality of being well qualified, to perform a specific role. For instance, management competency might include systematic thinking as well as emotional intelligence, and skills in influence and negotiation. Competency is also used as a more general description of the requirements of human beings in organizations and communities.

In emergencies, competent people may react to a situation following behaviors they have previously found to succeed. Regardless of training, however, competency grows through experience and the extent to which an individual is willing to learn and adapt. Competency has

different meanings and continues to remain one of the most diffused terms in the management development sector as well as in the organizational and occupational literatures. Dreyfus and Dreyfus (1980) introduced nomenclature for the levels of competence in competency development. The causative reasoning of such a language of levels of competency may be seen in their paper on calculative rationality titled "From Socrates to Expert Systems: The Limits and Dangers of Calculative Rationality". The five levels proposed by Dreyfus and Dreyfus were:

1. Novice: Rule-based behaviour, strongly limited and inflexible.
2. Experienced Beginner: Incorporates aspects of the situation.
3. Practitioner: Acting consciously from long-term goals and plans.
4. Knowledgeable Practitioner: Sees the situation as a whole and acts from personal conviction.
5. Expert: Has an intuitive understanding of the situation and zooms in on the central aspects

The process of competency development is a lifelong series of doing and reflecting. As competencies apply to careers as well as jobs, lifelong competency development is linked to personal development as a management concept. And it requires a special environment, where the rules are necessary in order to introduce novices, but people at a more advanced level of competency will systematically break the rules if the situation so demands. This environment is synonymously described using terms such as learning organization, knowledge creation, self-organizing and empowerment.

The four general areas of competency are:

1. **Meaning Competency:** The person assessed must be able to identify with the purpose of the organization or community and act from the preferred future in accordance with the values of the organization or community.
2. **Relation Competency:** The ability to create and nurture connections to the stakeholders of the primary tasks.
3. **Learning Competency:** The person assessed must be able to create and look for situations that make it possible to experiment with the set of solutions that make it possible to complete the primary tasks by reflecting on experience.
4. **Change Competency:** The person assessed must be able to act in new ways that will promote the purpose of the organization or community and make the preferred future existent.

### **Competency Identification**

Competencies are identified through job or task analysis, using techniques such as the critical incident technique, work diaries, and work sampling (Robinson, 2010). The Occupational Competency Movement was initiated by David McClelland in the 1960s with a view to moving away from traditional attempts to describe competency in terms of knowledge, skills and attitudes and to focus instead on the specific self-image, values, traits, and motive dispositions that are found to consistently distinguish outstanding from typical performance in a given job or role. It should be noted that different competencies predict outstanding performance in different roles, and that there is a limited number of competencies that predict outstanding performance in any given job or role. Thus, a trait that is a "competency" for one job might not predict outstanding performance in a different role.

Nevertheless, as can be seen from Raven, (2001) and Stephenson, (2010), there have been important developments in research relating to the nature, development, and assessment of high-level competencies in homes, schools, and workplaces.

Therefore, Occupational Competency is defined as a set of characteristics that allow one to perform the duties of his/ her occupation. This can be divided into three areas:

1. Knowledge or stored information: Davenport and Prusak (1998) defined knowledge as, "a fluid mix of framed experience, contextual information, values and expert insight that provide a framework for evaluating and incorporating new experiences and information. It is the information that one has learned and can recall in performing an occupation.
2. Skill: An ability and capacity acquired through deliberate, systematic, and sustained efforts to smoothly and adaptively carryout complex activities or job functions involving ideas (cognitive skills), things (technical skills), and/or people (interpersonal skills).
3. Attitude: Is a predisposition or a tendency to respond positively or negatively towards a certain idea, object, person, or situation. Attitude influences an individual's choice of action and response to challenges, incentives, and rewards (together called stimuli).

In order to accomplish the objectives of this research, it is essential to understand the characteristics of occupational competency analysis as highlighted below; Rationale for designing occupational competency analysis profile: Occupational competency analysis profile identifies the essential behavior model for professionals to carry out a task or mission. This behavioral model includes motive, characteristic and skill or knowledge.

Specifically, competency refers to the performance that a person has to implement in order to work effectively, especially when adequately playing a role or undertaking a

task/mission. Furthermore, it can be observed and measured (International Labour Organization, 2002). Thus, competency is not only the aggregation of knowledge, skills and attitude but also a dynamic concept of putting action into practice. In particular, it also means to accomplish the purpose of learning outcome under a specific need.

The work of automotive mechanics has evolved from mechanical repair to a high technology job. Today, integrated electronic systems and complex computers run vehicles and measure their performance while on the road. Technicians must have an increasingly broad based knowledge about how vehicles' complex components work and interact as well as the ability to work with electronic diagnostic equipment and computer-based technical reference materials.

Automotive technicians use high-tech skills to inspect, maintain, and repair automobiles. The increasing sophistication of automotive technology now requires workers who can use computerized shop equipment and work with electronic components while still maintaining the traditional hand tools skills. Automotive technology is rapidly increasing in sophistication, and most training authorities strongly recommend that persons seeking automotive service technical and mechanical jobs should complete a formal training program in high school or in a postsecondary vocational school. However, some service technicians still learn the trade solely by apprentice i.e assisting and learning from experienced workers.

Many high schools, community colleges, and public and private vocational and technical schools offer automotive service technical training programs. The traditional postsecondary programs usually provide a thorough career preparation that expands the student's high school repair experience. Beginners usually start as trainee technicians, mechanics' helpers, and others and gradually acquire and practise their skills by working with experienced mechanics and technicians. Progressively, they perform many routine service tasks and make simple repairs. It

usually takes 2 to 5 years of experience to become a journey-level service technician, who is expected to quickly perform the more difficult types of routine service and repairs. However, some graduates of postsecondary automotive training programs are often able to earn promotion to the journey-level after only a few months on the job. An additional 1 to 2 years of experience familiarizes mechanics and technicians with all types of repairs. Difficult specialties, such as transmission repair, require another year or two of training and experience.

### **Diagnoses and Service of Battery and Charging**

1. Perform battery state-of-charge test to determine needed service
2. Perform battery capacity test to determine needed service
3. Inspect and clean battery cables, connectors, clamps, and hold-downs; repair or replace as needed.
4. Start a vehicle using jumper cables and a battery or auxiliary power supply according to manufacturers recommended specifications.
5. Maintain or restore electronic memory functions.
6. Inspect, clean, fill, and replace battery.
7. Perform slow/fast battery charge.
8. Perform charging system output test to determine necessary action.
9. Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions.
10. Perform charging circuit voltage drop tests; determine necessary action.
11. Inspect and adjust alternator (generator) drive belts; replace as needed.
12. Inspect and test voltage regulator/regulating circuit; perform necessary action.
13. Remove, inspect, and install alternator (generator).

14. Disassemble alternator (generator), identify, clean, inspect, and test components; determine necessary action

### **Diagnoses and Service of Starting System**

1. Perform starter current draw tests to determine necessary action.
2. Perform starter circuit voltage drop tests to determine necessary action.
3. Inspect and test starter relays and solenoids; replace as needed.
4. Remove and install starter.
5. Inspect and test switches, connectors, and wires of starter control circuits; perform necessary action.
6. Perform starter bench tests; determine necessary action.
7. Disassemble, clean, inspect, and test starter components; replace as needed

### **Diagnoses and Service of Lightening and Accessories**

1. Diagnose incorrect operation of motor-driven accessory circuits to determine necessary action.
2. Diagnose supplemental restraint system (SRS) concerns to determine necessary action.  
(Note: follow manufacturer's safety procedures to prevent accidental deployment).
3. Diagnose incorrect heated glass operation to determine necessary action.
4. Diagnose incorrect electric lock operation to determine necessary action.
5. Diagnose incorrect operation of cruise control systems; repair as needed.
6. Diagnose radio static and weak, intermittent, or no radio reception to determine necessary action.
7. Diagnose the cause of brighter than normal, intermittent, dim, or no light operation; determine necessary action.

8. Inspect, replace, and aim headlights and bulbs.
9. Inspect and diagnose incorrect turn signal or hazard light operation; perform necessary action

### **Employability Competencies in Automobile Body and Electrical System**

There is no singular definition of employability; a review of relevant literatures suggests that employability is about work and the ability to be employed, such as: a person's capability of gaining initial employment, maintaining employment, and obtaining new employment if required (Hillage and Pollard, 1998). In simple terms, employability is about being capable of getting and keeping fulfilling work. More comprehensively, employability is the capability to move self-sufficiently within the labour market to realize potential through sustainable employment. For individuals, employability depends on the knowledge, skills and abilities they possess, the way they use those assets and present them to employers, and the context (e.g. personal circumstances and labour market environment) within which they seek work (Hind and Moss, 2011).

Employability is a two-sided equation and many individuals need various forms of support to overcome the physical and mental barriers to learning and personal development (i.e. updating their assets). Employability is not just about vocational and academic skills. Individuals need relevant and usable labour market information to help them make informed decisions about the labour market options available to them. They may also need support to realize when such information would be useful, and to interpret that information and turn it into intelligence. Finally, people also need the opportunities to do things differently, to access relevant training and, most crucially employment. Both the supply and demand of labour need to be taken into



account when defining employability, which is often dependent on factors outside of an individual's control.

Though many assume that the potential employability of a job applicant today focuses primarily upon that applicant's academic capabilities, surprisingly this does not always take precedence over other non-academic capabilities when it comes to employability. Though virtually every prospective employer considers a job applicant's academic proficiency of value (Bottoms, Presson & Johnson, 1992; Schug & Western, 1999), Asher (1988) found that some employers place more emphasis on non-academic skills such as enthusiasm, cooperativeness, discipline and dependability than upon academic proficiency. Cotton (1993) reported that many of the employers she surveyed would prefer that institutions take a step beyond basic academics and incorporate the teaching of higher-level effective skills in their curricula.

However, Schug & Western (1999) of the Wisconsin Policy Research Institute defended schools' emphasis on academic preparedness in stating that "schools have never solved the problem of what to do...by turning away from academic goals". Hull & Parnell (1991) believed that it is essential that schools maintain a balance in regard to academic and non-academic emphases arguing that "we can no longer...speak of the liberal arts versus the practical arts as though we live and learn in separate worlds. The students of the future will need both..." in order to survive in the workplace.

Thus, it is extremely difficult to establish a consensus as to which specific employability skills are universally considered the most essential by today's employers. However, in reviewing surveys conducted by others as well as business and government-based studies, a general list can be constructed that will narrow the specifics to a manageable number. For example, Poole (1985) identified 76 "critical employability skills" listed within nine categories and these skills focused solely upon one attribute – human relations. However, other researchers tend to narrow their lists

to a more manageable number and generally grouped employability skills into three or four separate categories. Schwartz (1998) categorizes her list of “job readiness skills” under three headings:

1. Academic Skills; which focus upon an employee’s ability to learn quickly and willingly; to have a knowledge of standard English for speaking, writing and understanding; and to have the ability to do basic calculations, use numerical formulas and charts, and estimate quantities.
2. Vocational Skills; which focus upon the ability to solve problems; to communicate clear instructions or explanations and to understand what supervisors want from them; and to have the ability to be able to do manual tasks, to construct and assemble materials, and use job-related equipment.
3. Work-Related Habits and Attitudes; to have a general understanding of the workplace and the world of business; to be dependable and punctual; to be willing to ask questions and accept correction; to be trustworthy and honest; to have a respectful and positive attitude; to be patient and cooperative in working on projects until completion, and to be appropriate in regard to appearance, hygiene and dress.

Hill & Petty (1995) focused solely on the “occupational work ethic” in their study and determined that the employers they surveyed considered an employee’s interpersonal skills, personal initiative and dependability paramount in regard to workplace readiness. Carson, Huelskamp & Woodall (1993) narrowed their list significantly in reviewing studies by the Michigan Education Department and the Rochester New York School District in finding that employers are looking primarily for four basic attributes: punctuality, respect for others, the ability to follow directions, and honesty. Surprisingly, they discovered that these studies further revealed that basic academic skills were considered among the least important of employability

skills. Theil (1985), however, disputed that employers do not consider basic academic skills of significance. In her study of a 1982 Center for Public Resources survey, employers in that survey stated that the low literacy rate of entry-level employees was evident in that 30% of the secretarial staff could not read effectively, 50% of the managerial and supervisory staff could not write a paragraph free of mechanical error, and 50 % of the skilled and unskilled employees could not solve basic math problems using decimals and fractions.

Bottom, Presson & Johnson (1992) reinforced the argument that academics are of importance to employers. In their study, these researchers contended that employers tend to seek entry-level employees “who can read a technical manual, write a report, communicate effectively with supervisors and coworkers and make wise decisions”. Hull & Parnell (1991) found in their study that the employers they surveyed tend to seek the best of both the academic and non-academic worlds in regard to employability skills. Their study revealed that employers seek candidates who have a sound academic base in regard to speaking, writing and calculation but also prefer that those candidates possess the ability to learn new technologies, use computers as informational systems, are adept at interpersonal skills, and have the ability to do independent problem solving.

Thus, as the review of the literature indicates, there is no true consensus among the very diverse employers as to which employability attributes are considered essential in an entry-level candidate. Fortunately, a commission established by the Federal Government undertook a similar study in the early 1990’s that this project can use as an informational base. The Secretary’s Commission on Achieving Necessary Skills (SCANS) was “asked to define the know-how needed in the workplace” (SCANS, 1992) and to “determine the skills that our young people need to succeed in the world of work”. Following a 1991 SCANS initial report entitled “What Work Requires of Schools”, the 1992 report established a list of foundation skills and workplace

competencies using input from a broad-based consortium of employers. These skills and competencies, referred to as “workplace know-how”, defined the five competencies in the “workplace competencies” category as

1. resources
2. interpersonal skills
3. information,
4. systems, and
5. technology

and the three skills defined in the “foundation skills” category were:

1. basic skills
2. thinking skills, and
3. personal qualities.

For the purpose of specificity related to the survey that this paper is to construct, each of the five competencies and three skills are defined as follows:

**Workplace Competencies:**

1. Resources: Knowing how to allocate time, money, materials and space.
2. Interpersonal Skills: Knowing how to work on teams, teach others, serve customers and work well with others of culturally diverse backgrounds.
3. Information: Knowing how to acquire data, maintain files, communicate, and use computers to process information.
4. Systems: Knowing social, organizational and technological systems and monitor and correct their own performance.
5. Technology: Knowing how to select equipment and tools, apply technology to specific tasks, and troubleshoot equipment.

**Foundation Skills:**

1. Basic Skills: Knowing how to read, write, speak, listen, and use arithmetic and mathematics.
2. Thinking Skills: Knowing how to learn, to reason, to be creative, to make decisions, and to solve problems.
3. Personal Qualities: Possessing individual responsibility, self-esteem and self-management; having integrity and honesty; and being sociable.

Throughout this report, each of the competencies and skills is defined in greater specificity. For example, under the ‘mathematics’ category, SCANS states that an entry-level employee should graduate from high school capable of understanding “mathematics well enough to make simple computations, estimate results, interpret and develop diagrams and charts, work with computer programs, and apply mathematics in real-world situations (such as estimating unit costs or volume discounts” ).

According to Hull & Parnell (1991), “is practical, down-to-earth advice on how to improve student learning for that great group of ordinary students called the neglected majority” who directly, upon graduation, expect to be viable employability candidates in today’s workforce. Unfortunately, according to employer assessments, this group is universally lacking in the “higher, more comprehensive skills necessary for the workplace” and “in an information-rich but application-poor society” these candidates may have difficulty succeeding.

Gray & Herr (1995) supported the claim that today’s primary and secondary educational systems do not focus enough upon Hull & Parnell’s “neglected majority”. Believing that these students are “not receiving their fair share of high school educational resources”, they argue that

these students' "success and failure are just as important to the larger society, to the community, and to their families as are those of the academically blessed, and their preparation for the future should be just as important to their high schools as well".

### **Identifying employability skills**

This report provides examples of approaches taken to identify employability skills. These primarily sit within the context of graduate attributes – determined at a university level and then identified at a faculty, discipline, qualification and subject level through a range of approaches including consultations with employers, students and professional bodies. Some universities have taken highly structured approaches to mapping graduate attributes across curriculum to ensure that these attributes can be readily seen across an entire program or qualification. This enables the identification of gaps and alignment of graduate attributes with discipline-specific content. However many universities have not yet undertaken detailed curriculum mapping for employability skills or graduate attributes, in qualifications; it is therefore not possible to readily see how a given qualification addresses the development and assessment of employability skills.

### **Developing employability skills**

The higher education sector is characterized by diversity; course and student profiles are different and universities aim to develop students with distinct characteristics or attributes. Universities have taken different approaches in the manner in which they develop graduate employability skills. Universities work to develop employability skills in their students by providing academic staff with relevant support and resources, integrating these skills into curriculum and course design, providing students with work placements and exposure to professional settings and providing advice and guidance through career services. Furthermore,

universities offer students opportunities for developing themselves through participation in clubs and societies and university life.

In addition to the part that universities play in developing students' employability skills, it should be recognized that most students are concurrently developing these skills through part-time employment, volunteer work and community participation. Fieldwork, industry-based learning, sandwich years, cooperative education, work placements and internships, commonly called Work Integrated Learning (WIL) programs, are all methods universities have used to equip students with knowledge of current workplace practices.

These programs are resource intensive for business and academic staff. There is little objective evidence available on the relative effectiveness of each of these approaches. British research shows that relevant work experience during the degree program has a highly positive influence on employability as does employer involvement in course design and delivery.

### **Component of Employability**

This suggests that we can separate out four main elements in respect of individuals' employability: the first three are analogous to the concepts of production, marketing and sales, and the fourth is the marketplace in which they operate. Everyone wants to find and keep a good job and earn money. It's hard to find and keep a good job if you do not understand and use those skills an employer seeks in every employee. We call these skills "Employability Essentials for Success." These are skills that are important in any job in any career pathway. If you possess these skills, you can be taught the technical skills needed for a specific position and company.

## **Core Academic Skills**

Core academic skills are considered essentials. Reading, writing and arithmetic have always been important to success in daily life and in work. Presentation skills and technology skills have become crucial in many areas of life in the 21st century as well.

### **Communication skills**

**1. Strong verbal and written skills:** Below are some examples of situations when verbal and written skills are best displayed.

Examples of verbal communication in the work place include:

- Inquiring about job possibilities and requesting an application.
- interview process
- questions during the orientation process
- introductions and interaction with co-workers, supervisors and internal/external customers

Keep in mind that written communication is not just your penmanship; it is also your grammar, sentence structure and descriptions.

Examples of written communication in the work place include:

- The creation of your resume and cover letter.
- Completing an application.
- Filling out paperwork for new hire orientation.



- Paperwork that is required on the job.
- Internal and external memos, letters and e-mails.

**2. Listening skills:** Listening is the most frequently missed piece in the communication process. Many individuals think they are listening, however they can only describe portions of what they just heard, if any.

Tips for successful listening:

- Assume that what someone is telling you is new information and something from which you can learn.
- Give the speaker your undivided attention and you will be a better listener.
- Paraphrase what you have just heard to ensure that you correctly understand what the individual has shared with you.

**3. Presentation skills:** Good presentation skills include the ability to present oneself, an idea, or information in a professional manner.

Tips for successful presentation skills:

- Watch your posture; stand up straight or sit up straight.
- Good eye contact with your audience.
- Don't read from your notes or resume; you should know your work history.
- Be enthusiastic about your subject no matter what your presentation is about.
- Be aware of your body language (i.e. fidgeting, tapping, limited hand gestures).

- Speak clearly and project your voice appropriately for your audience

### **Employability essentials for success**

**1. Math skills:** There are various levels of math skills required depending on the position you hold. Examples of math skills in the hiring process, the workplace and daily life:

- Pre-employment assessment testing.
- Counting change back to a customer.
- Measurements.
- Tracking product and production.
- Daily required paperwork (graphs, budgets, etc.).
- Keeping track of your expenses.
- Balancing your checkbook.
- Completing your taxes.

**2. Reading skills:** A job seeker must be able to read to complete an employment application. Even if a candidate is able to take the application off site to have someone else complete it, there is paperwork that he/she must complete upon hiring that will require reading skills. In today's workforce virtually every job requires reading skills beyond the 9th grade level. Upon hiring it is imperative that you read your entire employee handbook and understand it!

**3. Technology skills:** Technology skills are an integral part of our everyday life and will increase with time. Examples of technology skills necessary to succeed in today's

workplace: Looking for work opportunities online, researching the company for whom you would like to apply. Performing the online application process. In some situations you will need to know how to attach a document such as your resume and cover letter along with completing an application online, possessing basic knowledge and experience with Microsoft Suite applications (Word, Excel, PowerPoint, Outlook, Access).

- 4. Accuracy:** Accuracy the ability to be precise and avoid errors. Be sure to do your work correctly the first time. You may know what you are doing, but if you are careless (not accurate), it gives the appearance that you don't know what you are doing at all. Take time to proofread all of your projects/assignments before submitting them.
- 5. Good attendance:** No matter how talented you are at your job, if you do not come to work, you will be replaced by someone who does show up everyday.
- 6. Problem solving abilities:** Work is really a series of problems that need to be solved. This is where employees can really set themselves apart from the average worker. Those that can use their knowledge and skills to creatively and effectively solve problems will excel in their work. Those that must rely on others to solve problems, will stay in the positions that they are in, or be passed up by those that can solve problems well. Companies want employees who can look at the "big picture" and see ways to improve the quality of their projects/assignments.
- 7. Punctuality:** You are being paid to start work at a certain time every day. The company is depending on you to be to work when scheduled. Don't let the snooze button keep you from reaching your career goals!

- 8. Safety awareness:** Obviously, someone who is careless and not aware of safety procedures can be a great hazard to a company. This is becoming more and more important as companies may find themselves with injuries resulting in lost time, OSHA violations, or lawsuits that can cost them enormous amounts of money. Often new workers are not aware of the seriousness of safety concerns and may ignore or make light of safety procedures. If you are uncertain of the safety precautions related to your position, speak with your supervisor. Stay alive! Make safety your number one priority every minute you are at your job.
- 9. Time management:** All of the knowledge and skills in the world will not help you in your job if you are not able to do the job because you have too many things going, or have bits and pieces of many things going, and are not able to complete any of them with quality. Multitasking is becoming a way of the world. Don't over commit yourself and not be able to follow through on your commitments. Assess your workload every day and decide what the priorities are that must be accomplished first.

### **Personal characteristics/interpersonal skills**

Producing quality goods and services is critical to business success today. Companies rely on employees who have good personal characteristics and interpersonal skills to produce quality goods and services. Having confidence in your abilities, being a team player and having a positive attitude are some of the characteristics that affect the quality of your work.

- 1. Appropriate professional appearance:** Most companies have policies on appropriate attire. Be sure to refer to this policy or ask your supervisor if you are unsure of the company's expectations for appropriate attire. First impressions are formed based on image and you want yours to be an outstanding first impression.

2. **Confidence in your ability:** Be sure to keep lines of communication open with your internal customers. Ask, “Is this what you are looking for?” “How can I make this better?” Confirming expectations and asking for feedback assist you in building your confidence which in turn improves your performance within an organization.
3. **Flexibility:** Don’t dwell on your job description. Be willing and eager to go above and beyond to help your organization. Change is a constant in the world of work. Embrace change and be flexible when needed.
4. **Honesty/Ethics:** There is no room for error in honesty. Employees who are dishonest and unethical cannot be trusted by their coworkers or customers.
5. **Initiative:** Initiative is having the ability to begin or to follow through energetically with a plan or task. If you see something that needs to be done, GO FOR IT! Don’t wait for someone to tell you what to do. Volunteer for extra assignments if you have the time and skills needed.
6. **Positive attitude:** Attitude separates the winner from the losers. It can be more important than skill level or experience. You can demonstrate a positive attitude by accepting assignments willingly and also accepting constructive criticism when given. Be considerate of others, smile and be pleasant, and others will treat you the same way.
7. **Reliability:** You were selected for a job and are expected to be at that job as scheduled and on time. Your supervisor shouldn’t have to wonder each day if you will or won’t show up for work. Your coworkers rely on you to be part of their team and do your part, so they can do theirs.

8. **Respect diversity:** Diversity means varied or different. Diversity is more than just a race or gender issue. Diversity in today's workplace is acceptance of people of various backgrounds whether that is gender, race, religion, sexual orientation, etc. Diversity in the workplace is also the ability to be respectful of others' ideas and opinions whether you agree with them or not. Many work environments function in teams and in order to be a successful individual on these teams, you must be able to listen to others' ideas and communicate in a respectful manner so that all ideas are heard prior to the groups' decision making process being completed. Treating others how you wish to be treated is basic common sense, however "the golden rule" does not always come first to mind when individuals feel threatened or when the workplace becomes a competitive environment. Not following this simple rule leads to inappropriate behavior in the workplace causing harassment issues in the workplace and costing organizations thousands of dollars in legal fees if not handled appropriately.
9. **Responsibility:** Responsibility is taking ownership of your position and rising to meet expectations. To be a responsible employee you must be a person who can be counted on to do the tasks you were assigned to do.
10. **Team player:** Rarely will you be assigned to do a task alone. Many times you will be asked to use teamwork with a team that includes your supervisor and more than one teammate. The task will get done much faster if everyone works together. Appreciate the diversity of your team and what each team member has to offer the group.
11. **Willingness to learn/Lifelong learner:** Training is a responsibility of the organization that hires you, and you have a responsibility to retain and utilize what is provided to you. One of the most underutilized benefits within many organizations is the tuition

reimbursement programs. Many organizations provide additional opportunities to learn by paying for voluntary in house educational seminars or tuition reimbursement for courses that you take outside of the organization. They usually have a contingency of a certain grade point and you will be reimbursed all or a portion of your tuition. Anytime that you have an opportunity to learn or participate in company sponsored or paid education is sure to take advantage.

### **Methods of Teaching Employability Skills**

Employability Skills are transferable core skill groups that represent essential functional and enabling knowledge, skills and attitudes required by the 21<sup>st</sup> century workplace. (Overtoom, 2000). They are necessary for career success at all levels of employment and education. According to Carnevale, 1990, the skill groups across job families are as follows:

1. Basic Competency Skills: reading, writing and composition.
2. Communication Skills: Speaking and listening.
3. Adaptability Skills: problem solving and thinking creativity.
4. Developmental Skills: self-esteem, motivation and goal setting, career planning.
5. Group effectiveness Skills: interpersonal skills, team work and Negotiation.
6. Influencing Skills: understanding organizational culture and sharing leadership.

Also, according to the Conference Board of Canada, 2000. Employers want employees who:

1. Value the importance of life long learning.
2. Communicate well (listen carefully and understand, speaks and write effectively).

3. Think clearly, assess critically, act logically and make decisions.
4. Have mathematical abilities and can solve problems.
5. Use technology, instruments, tools and information system.
6. Can access and apply specializes knowledge from other fields.
7. Feel good about themselves and who know how to manage their lives well and with integrity.
8. Have positive attitude and behave in positive ways.
9. Have personal ethics, display initiative and persistence.
10. Take responsibility and are accountable.
11. Set goals and priorities and who manage their own time.
12. Are adaptable, able to think creatively, and work successfully in a team.
13. Automatically include others in their decision making process.
14. Show respect for the opinions and concern of co-workers.

### **Teaching Employability Skills**

The teaching of employability skills is currently identified using two methods.

**Method 1:** Developing/ teaching stand alone lesson: developing a complete lesson around an identified skill (i.e. resume writing, communication skills and interviewing techniques).



**Method 2:** Infusing Employability skills into existing lessons: highlighting the importance of the skill as it relates to a current lesson and to general work requirements. Secretary's Commission on Achieving Necessary Skills (SCANS, 1991) .

### **Methods of Disseminating New Employability Skills**

Anyale (2003) identifies the methods of disseminating new Employability Skills into three:-

1. The individual method/personal contact.
2. Group method.
3. Mass media.

**The individual method/personal contact:** Includes Industrial and Home visit, offices call, telephone calls and the use of letters and correspondence through an agent.

It has the following advantages

1. Individual receives more attention from the agent.
2. And gets information faster.

Disadvantages

1. It wastes a lot of time.
2. Many individual cannot be reached.
3. It is expensive.

**Group Method:** Includes organizing lectures, seminars and symposia and conducting tours.

It has the following advantages

1. Large group of people can be reached.

2. It saves cost and time.
3. It is not as tedious as in personal contact.
4. Others learn from their colleagues.

#### Disadvantages

1. The unserious ones can discourage the serious ones.
2. All members may not be present at the same time.

**Mass Media** Involves the broad cast through radio and television, Use of bulletins, newspaper, posters, pamphlets models, samples, and others

It has the following advantages

1. Large numbers of people can be reached.
2. The information can last long such as print media.
3. Very useful to the deaf and dumb.

#### Disadvantages

1. It is a very expensive method.

### **Summary of Related Literature**

The literature review revealed that the Automobile has played a very significant role in the socio-economic and technological development of every nation and has become an important entity to the existence of man, the reviewed literature revealed the Occupational and Employability Competencies Needs of Automobile Electrical Systems' Technicians serves as a way that improves a learner's understanding and approach to the contents and deals of work

habit, work situation, and workplace. The essentials have to integrate knowledge, skills and attitudes that the learner possesses.

The literature review further revealed that the Employability Competencies in Automobile Electrical System is the ability to be independent in the labour market by being willing and able to manage employment transitions between and within an organisation. However, literature review revealed the methods of Teaching Employability Skills.

## **CHAPTER III**

### **METHODOLOGY**

This chapter described the procedure used in the course of the study. Thus, the research design, area of the study, population of the study, the sampling size and technique, instrument for data collection, validation of instrument, administration of instrument, method of data analysis as well as the decision rules would be covered.

#### **Research Design**

In carrying out this study, the descriptive survey approach was used, where questionnaires are used to determine the opinion of the respondents on the issue under investigation. Yalams and Ndomi (1999) define survey research as the gathering of information about a large number of people or objects by studying a representative sample of the entire group through the use of questionnaires. In support of this, Nworgu, (1991) stated that research design is a plan or blue print which specifies how data relating to a given problem should be collected and analyze. Therefore, the survey research was considered suitable since the study will seek information from a sample that was drawn from a population using a questionnaire.

#### **Area of the Study**

The study was conducted in some selected industries and schools in Niger State; they include:-

1. Niger State Transport Authority (NSTA)
2. Peugeot Automobile Nigeria, Minna (PAN)
3. A. Bala Motors

4. Vocational Training College Minna (VTC).
5. Works Training School Minna (WTS).
6. Niger State Technical College, Minna.
7. Niger State College of Education Minna (COEM).
8. Federal Polytechnic Bida
9. Federal University of Technology Minna (FUTMIN).

### Population of the study

The target population for this study was made up of 47 Automobile Technicians, 30 Automobile Teachers and 59 Automobile Lecturers, within the selected area in Niger State.

**Table 3.1: Shows the target population of Automobile Technicians, Automobile Lecturers and Automobile Teachers, within the selected area in Niger State.**

S/NO	TECHNICIANS	NO.	TEACHERS	NO.	LECTURERS	NO.
1	Niger State Transport Authority (NSTA)	33	Vocational Training College Minna (VTC).	8	Niger State College of education, Minna.	5
2	Peugeot Automobile Nigeria, Minna. (PAN)	7	Works Training School Minna (WTS).	7	Federal University of Technology Minna (FUTMIN).	39
3	A. Bala Motors	7	Niger State Technical College, Minna.	15	Federal Polytechnic Bida	15
<b>TOTAL</b>		<b>47</b>		<b>30</b>		<b>59</b>

### Sample size and sampling techniques

A Simple Random Sampling (SRS) was employed in the selection of the sample for the study to sample the Automobile Technicians, Automobile Teachers and Automobile Lecturers giving the total of one hundred and thirty six (136) personnel. The sample of the study is made up of three Automobile Industries, schools and higher institutions respectively in Niger State. This method is used to give every Automobile Technicians, Automobile Lecturers and Automobile Teachers in the population equal chance of being selected into the sample.

**Table 3.2: Shows the sample population of Automobile Technicians, Automobile Lecturers and Automobile Teachers, within the selected area in Niger State.**

S/NO	TECHNICIANS	NO.	TEACHERS	NO.	LECTURERS	NO.
1	Niger State Transport Authority (NSTA)	25	Vocational Training College Minna (VTC).	8	Niger State College of education, Minna.	4
2	Peugeot Automobile Nigeria, Minna. (PAN)	6	Works Training School Minna (WTS).	6	Federal University of Technology Minna (FUTMIN).	29
3	A. Bala Motors	6	Niger State Technical College, Minna.	12	Federal Polytechnic Bida	11
<b>TOTAL</b>		<b>37</b>		<b>26</b>		<b>44</b>

### **Instrument for Data Collection**

The instrument used for data collection was a structured questionnaire developed by the researcher for this study. It consisted of two (2) parts in which the first indicate the introductory part of the respondents and the second part is divided into five sections A, B, C, D and E. All items are to be responded to by indicating the appropriate respondent's best perception using three point rating scales. Section A contains (13) items which deals with the the occupational competencies needed by Automobile Electrical System technician in general automotive body electrical system diagnosis. Section B also contains (10) items which deals with the the occupational competencies needed by Automobile Electrical System technician in battery and charging system diagnosis and repair. Section C contains (10) items which deals with the the occupational competencies needed by Automobile Electrical System technician in starting system diagnostic and repair. Section D contains (9) items which deals with the the occupational competencies needed by Automobile Electrical System technician in lighting and accessories system diagnosis and repair and Section E contains (39) items which deals with the the general employability competencies needed by automobile technicians for automobile body electrical system.

### **Validation of Instrument**

The instrument for the data collection was designed by the researcher and were validated by (3) Lecturers, two(2) from Industrial and Technology Education Department in Automobile and Technology option and the other from the department of Automobile Technology of the Niger State College of Education, Minna to ascertain the appropriateness of questionnaire items before administering it to respondents.

### **Administration of the Instrument**

The instrument for the study was administered to the respondents by the researcher through the help of one research assistant from each industry and school which was later collected through the research assistant by the researcher after appropriately completed by the respondents.

### **Method of Data Analysis**

The analysis of data for the research questions and hypothesis were accomplished using the frequency count, mean and analysis of variance (ANOVA). The mean was used to determine the degree of acceptance or rejection in research questions, while analysis of variance (ANOVA) was used to test the hypotheses of two groups of respondents.

### **Decision Rule**

The mean of 2.00 was used as decision point for every questionnaire item. Consequently, any item with mean responses of 2.00 and above was considered to be needed. Any item with a mean response of 1.99 and below was equally considered not needed in Section A, B, C, D and E respectively. Also in analysis of variance (ANOVA) test was used to test the hypothesis at 0.05 level of significant to compare the mean response of the groups. A F-ratio of 3.26, 3.35 and 3.62 were selected based on the degree of freedom at 0.05 level of significant. Therefore, any item with analysis of variance (ANOVA) calculated value less than the critical was regarded as not significant. While any item with calculated value equal or greater than the critical was regarded as significant.



## CHAPTER IV

### PRESENTATION AND ANALYSIS OF DATA

This chapter deals with the presentation and analysis of data with respect to the research questions and hypothesis formulated for the study.

#### Research Question I

What are the Occupational Competencies Needed by Automobile Electrical Systems' Technicians in General Automotive Electrical System Diagnosis?

**Table 4.1: Mean responses of Automobile Electrical Systems' Technicians in General Automotive Electrical System Diagnosis.**

		<b>N<sub>1</sub> = 40, N<sub>2</sub> = 26, N<sub>3</sub> = 23</b>				
<b>S/NO</b>	<b>ITEMS</b>	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_t$	<b>REMARK</b>
1.	Interpret and verify shop safety rules and procedures	2.80	3.00	2.78	2.86	Needed
2.	Check and prepare tools, equipment, and materials correctly	2.66	2.71	2.88	2.75	Needed
3.	Read and use wiring diagram of automobile electrical circuits.	2.60	2.72	2.65	2.66	Needed
4.	Check automobile electrical circuits with a test lamp; determine necessary action	2.62	2.52	2.74	2.63	Needed
5.	Check voltage/voltage drop, current, resistance in automobile electrical circuits and components using an analog multi meter and a digital multi meter.	2.67	2.81	2.78	2.75	Needed
6.	Check current flow in automobile electrical circuits and components by using ammeter.	2.62	2.77	2.55	2.65	Needed
7.	Check continuity and resistances in automobile electrical circuits and components using ammeter.	2.25	2.38	2.72	2.54	Needed
8.	Explore shorts, grounds, open-close circuit, and resistance problems in automobile electrical circuits and components.	2.28	2.44	2.50	2.41	Needed

9.	Repair wiring, sockets, and connectors of automobile electrical circuits and components.	2.73	2.58	2.68	2.66	Needed
10.	Measure and diagnose the cause(s) of abnormal key-off battery drain.	2.30	2.19	2.61	2.37	Needed
11.	Perform solder repair of electrical wiring damage in various automobile electrical parts.	2.40	2.15	2.70	2.42	Needed
12.	Inspect and test power sources, fusible links, circuit breakers, and fuses.	2.63	2.46	2.39	2.49	Needed
13.	Inspect and test switches, connections, relays, and wires of electrical circuits and components.	2.73	2.77	2.35	2.62	Needed

**Key:**  $N_1$  = Automobile Technicians,  $N_2$  = Automobile Teachers,  $N_3$  = Automobile Lecturers,

$\bar{X}_1$  = Mean of response of Automobile Technicians,  $\bar{X}_2$  = Mean of response of Automobile Teachers,  $\bar{X}_3$  = Mean of response of Automobile Lecturers,  $\bar{X}_t$  = Average mean of responses of Automobile Electrical Systems' Technicians in General Automotive Electrical System Diagnosis.

The analysis of mean responses of the three groups of respondents from table 4: reveals that the items under this sub-heading are rated as needed with mean score ranging between 2.37- 2.86 respectively. This signifies that the Occupational Competencies Needed by Automobile Electrical Systems' Technicians in General Automotive Electrical System Diagnosis.

### Research Question II

What are the Occupational Competencies Needed by Automobile Electrical Systems' Technicians in battery and charging system diagnosis and repair?

**Table 4.2: Mean responses of Automobile Electrical Systems' technicians in battery and charging system diagnosis and repair.**

$N_1 = 40, N_2 = 26, N_3 = 23$

S/NO	ITEMS	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_t$	REAMRK
1.	General safety rules pertaining to battery and charging system diagnosis and service	2.77	2.85	2.78	2.80	Needed
2.	Inspect, clean, distillation fill, and replace battery	2.69	2.73	2.43	2.62	Needed

3.	Removal, inspection, and installation of alternator	2.69	2.58	2.61	2.63	Needed
4.	Use hydrometer testing check and read the specific gravity of sulphuric acid.	2.50	2.84	1.83	2.39	Needed
5.	Diagnose charging system for the cause of undercharge, no-charge, and overcharge conditions according to manufacturers recommended specifications	2.51	2.54	2.30	2.45	Needed
6.	Perform alternator bench test.	2.48	2.77	2.22	2.49	Needed
7.	Perform alternator ground leak test.	2.33	2.52	2.26	2.37	Needed
8.	Performing charging system output test using ammeter to determine when the battery need recharging.	2.38	2.40	2.43	2.40	Needed
9.	Disassembling alternators, clean, inspect and test for performance.	2.51	2.65	2.30	2.49	Needed
10.	Performing charging circuit voltage drop tests to determine necessary action according to manufacturers recommended specifications	2.33	2.77	2.43	2.51	Needed

**Key:**  $N_1$  = Automobile Technicians,  $N_2$  = Automobile Teachers,  $N_3$  = Automobile Lecturers,

$\bar{X}_1$  = Mean of response of Automobile Technicians,  $\bar{X}_2$  = Mean of response of Automobile Teachers,  $\bar{X}_3$  = Mean of response of Automobile Lecturers,  $\bar{X}_t$  = Average mean of responses of Automobile Electrical Systems' Technicians in battery and charging system diagnosis and repair.

The analysis of mean responses of the three groups of respondents from table 4.1: reveals that the items under this sub-heading are rated as needed with mean score ranging between 2.37- 2.80 respectively. This signifies that the Occupational Competencies Needed by Automobile Electrical Systems' Technicians in battery and charging system diagnosis and repair.

### Research Question III

What are the Occupational Competencies Needed by Automobile Electrical Systems' Technicians in Starting System Diagnostic and Repair?

**Table 4.3: Mean responses of Automobile Electrical Systems' Technicians in Starting System Diagnostic and Repair.**

**N<sub>1</sub> = 40, N<sub>2</sub> = 26, N<sub>3</sub> = 23**

S/NO	ITEMS	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_t$	REMARK
1.	General safety rules for diagnosing and repairing starting system	2.79	2.77	2.74	2.77	Needed
2.	Check and prepare tools, equipment, and materials correctly	2.73	2.81	2.64	2.73	Needed
3.	Inspect and test starter relays, solenoids, clutch, gear train	2.53	2.54	2.43	2.50	Needed
4.	Verify and interpret starting system problem by using instructional manual	2.30	2.23	2.43	2.32	Needed
5.	Remove, install and clean starter motor and accessories.	2.45	2.50	2.53	2.49	Needed
6.	Perform starter current draw tests using appropriate tools.	2.55	2.54	2.30	2.46	Needed
7.	Perform starter bench test.	2.32	2.65	2.22	2.40	Needed
8.	Perform starter ground leak test	2.38	2.46	2.30	2.38	Needed
9.	Interpret and verify environmental protect, energy conservations, public mind, and Procedures	2.10	2.15	2.13	2.13	Needed
10.	Inspect and test control equipment (e.g., ignition switch, connectors, and starter circuit.	2.58	2.73	2.27	2.53	Needed

**Key:** N<sub>1</sub> = Automobile Technicians, N<sub>2</sub> = Automobile Teachers, N<sub>3</sub> = Automobile Lecturers,

$\bar{X}_1$  = Mean of response of Automobile Technicians,  $\bar{X}_2$  = Mean of response of Automobile Teachers,  $\bar{X}_3$  = Mean of response of Automobile Lecturers,  $\bar{X}_t$  = Average mean of responses of Automobile Electrical Systems' Technicians in Starting System Diagnostic and Repair

The analysis of mean responses of the three groups of respondents from table 4.2: reveals that the items under this sub-heading are rated as needed with mean score ranging between 2.13- 2.77 respectively. This signifies that the Occupational Competencies Needed by Automobile Electrical Systems' Technicians in Starting System Diagnostic and Repair.

#### Research Question IV

What are the Occupational Competencies Needed by Automobile Electrical Systems' Technician in Lighting and Accessories System Diagnosis and Repair?

**Table 4.4: Mean responses of Automobile Electrical Systems' Technicians in Lighting and Accessories System Diagnosis and Repair.**

		<b>N<sub>1</sub> = 40, N<sub>2</sub> = 26, N<sub>3</sub> = 23</b>				
<b>S/NO</b>	<b>ITEMS</b>	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_t$	<b>REMARK</b>
1.	Describe general safety rules pertaining to diagnosis and repair lighting and accessories system diagnosis and repair	2.68	3.00	2.74	2.81	Needed
2.	Check and prepare tools, equipment, and materials correctly for particular operation(s)	2.68	2.69	2.57	2.65	Needed
3.	Diagnose the cause of incorrect motor-driven accessory circuits.	2.38	2.38	2.43	2.40	Needed
4.	Inspect, replace and aim headlights and bulbs.	2.73	2.65	2.68	2.69	Needed
5.	Explore the position of power sources, control equipment, and component of lighting systems.	2.55	2.80	2.43	2.59	Needed
6.	Inspect and test automobile accessories systems (e.g., seat, power window, power door lock, power mirror, and sound) for cause of intermittent, high, low, or no operation	2.31	2.50	2.61	2.47	Needed
7.	Measure and diagnose the cause(s) of abnormal bright (e.g., brighter than normal, intermittent, dim, or no light operation.	2.45	2.81	2.35	2.54	Needed
8.	Diagnose the cause of heated glass, power door lock, power mirror.	2.40	2.25	2.35	2.33	Needed
9.	Identify the cause of supplementary restraint system (SRS) and other passive and active tests for safety systems	2.48	2.15	2.43	2.35	Needed

**Key:** N<sub>1</sub> = Automobile Technicians, N<sub>2</sub> = Automobile Teachers, N<sub>3</sub> = Automobile Lecturers,

$\bar{X}_1$  = Mean of response of Automobile Technicians,  $\bar{X}_2$  = Mean of response of Automobile Teachers,  $\bar{X}_3$  = Mean of response of Automobile Lecturers,  $\bar{X}_t$  = Average mean of responses of Automobile Electrical Systems' Technician in Lighting and Accessories System Diagnosis and Repair.

The analysis of mean responses of the three groups of respondents from table 4.3: reveals that the items under this sub-heading are rated as needed with mean score ranging between 2.33- 2.81 respectively. This signifies that the Occupational Competencies Needed by Automobile Electrical Systems' Technician in Lighting and Accessories System Diagnosis and Repair are appropriate.

#### Research Question V

What are the General Employability Competencies Needed by Automobile Technicians for Automobile Body Electrical System?

**Table 4.5: Mean responses of Automobile Electrical Systems' Technicians in General Employability Competencies**

**N<sub>1</sub> = 40, N<sub>2</sub> = 26, N<sub>3</sub> = 23**

S/NO	ITEMS	$\bar{X}_1$	$\bar{X}_2$	$\bar{X}_3$	$\bar{X}_t$	REMARK
1.	Conveying information one- to- one	2.68	2.84	2.68	2.73	Needed
2.	Communicating verbally to groups and peers.	2.56	2.38	2.65	2.53	Needed
3.	Making impromptu presentation.	2.38	2.04	2.57	2.33	Needed
4.	Ability to write report	2.44	2.85	2.65	2.65	Needed
5.	Using proper grammar, spelling and punctuation.	2.25	2.58	2.78	2.54	Needed
6.	Establishing good rapport with subordinate	2.55	2.78	2.61	2.65	Needed
7.	Working well with fellow employees	2.83	2.88	2.70	2.80	Needed
8.	Identifying sources of conflict among people	2.43	2.65	2.39	2.49	Needed
9.	Keeping up-to-date with external realities related to organization's success	2.51	2.62	2.48	2.54	Needed
10.	Resolving conflict	2.74	2.42	2.57	2.58	Needed
11.	Identifying problems.	2.73	2.58	2.65	2.65	Needed

12. Prioritizing problems.	2.40	2.26	2.35	2.34	Needed
13. Analyzing problems	2.78	2.73	2.57	2.69	Needed
14. Identifying essential components of problems.	2.71	2.44	2.30	2.48	Needed
15. Sorting out the relevant data to solve problems	2.68	2.54	2.61	2.61	Needed
16. Take decision in a short period of time.	2.56	2.50	2.30	2.45	Needed
17. Assessing long term effect of decision	2.35	2.12	2.45	2.31	Needed
18. Identifying political implications of the decisions arrived at.	2.00	2.12	2.52	2.21	Needed
19. Knowing ethical implications to be made.	2.40	2.16	2.26	2.27	Needed
20. Recognizing effect of decision to be made.	2.60	2.78	2.43	2.60	Needed
21. Assigning/ delegating responsibility.	2.65	2.35	2.17	2.39	Needed
22. Monitoring progress against plan.	2.46	2.58	2.30	2.45	Needed
23. Integrating strategic consideration in the plan made.	2.54	2.35	2.30	2.40	Needed
24. Allocating time efficiently.	2.63	2.73	2.43	2.60	Needed
25. Managing/ overseeing several tasks at once.	2.13	2.12	1.97	2.07	Needed
26. Meeting deadlines.	2.55	2.64	2.50	2.56	Needed
27. Listening attentively.	2.73	2.69	2.77	2.73	Needed
28. Responding to others comment during conversation.	2.33	2.50	2.17	2.33	Needed
29. Taking reasonable job related risks.	2.13	2.24	2.41	2.26	Needed
30. Identifying potential negative outcomes when considering a risk venture.	2.55	2.35	2.50	2.47	Needed
31. Self- Esteem	2.70	2.23	2.57	2.50	Needed
32. Responsibility.	2.88	3.00	2.87	2.92	Needed
33. Sociability.	2.68	2.81	2.73	2.74	Needed
34. Self- management.	2.75	2.77	2.62	2.71	Needed
35. Integrity/ honesty.	2.95	2.96	2.77	2.89	Needed
36. Consciousness.	2.85	2.81	2.86	2.84	Needed
37. Ability to work without supervision.	2.40	2.77	2.45	2.54	Needed
38. Adaptability/ flexibility.	2.48	2.81	2.51	2.60	Needed
39. Work safety.	2.79	2.96	2.64	2.80	Needed

**Key:** N<sub>1</sub> = Automobile Technicians, N<sub>2</sub> = Automobile Teachers, N<sub>3</sub> = Automobile Lecturers,

$\bar{X}_1$  = Mean of response of Automobile Technicians,  $\bar{X}_2$  = Mean of response of Automobile Teachers,  $\bar{X}_3$  = Mean of response of Automobile Lecturers,  $\bar{X}_t$  = Average mean of responses of Automobile Electrical Systems' Technician in General Employability Competencies.

The analysis of mean responses of the three groups of respondents from table 4.4: revealed that the items under this sub-heading are rated as needed with mean score ranging between 2.07- 2.80

respectively. This signifies that the Occupational Competencies Needed by Automobile Electrical Systems' Technician in General Employability Competencies are appropriate.

### **Hypothesis I**

HO<sub>1</sub>: There is no statistical significance difference between the mean responses of Automobile Technicians, Automobile Teachers and Automobile Lecturers on General Automotive Body Electrical System Diagnosis.

The result of the test of significance difference in mean responses of respondents on General Automotive Body Electrical System Diagnosis is presented in Table 4.6

**Table 4.6: One- way Analysis of Variance of the mean responses of the respondents on the General Automotive Body Electrical System Diagnosis**

<b>Sources of variation</b>	<b>Df</b>	<b>Sum of Squares</b>	<b>Mean Sum of Squares</b>	<b>f- cal</b>	<b>f- critical</b>	<b>Significance</b>	<b>Decision</b>
Between groups	2	0.0263	0.01315	0.321	3.26	NS	Accepted
Within groups	36	1.46	0.041				
Total	38	1.48683					

The hypothesis shows the f- calculated in Table 4.6 which is 0.321. Since the calculated f- ratio is below the f- critical of 3.36, the stated null hypothesis is accepted at 0.05 level of significant meaning there is no statistical significance difference in the mean responses of Automobile Technicians, Automobile Teachers and Automobile Lecturers on General Automotive Body Electrical System Diagnosis.



## Hypothesis II

HO<sub>2</sub>: There is no statistical significance difference between the mean responses of Automobile Technicians, Automobile Teachers and Automobile Lecturers on Battery and Charging System Diagnosis and Repair.

The result of the test of significance difference in mean responses of respondents on Battery and Charging System Diagnosis and Repair is presented in Table 4.7

**Table 4.7: One- way Analysis of Variance of the mean responses of the respondents on Battery and Charging System Diagnosis and Repair.**

Sources of variation	Df	Sum of Squares	Mean Sum of Squares	f- cal	f- critical	Significance	Decision
Between groups	2	0.0484	0.0242	0.773	3.35	NS	Accepted
Within groups	27	0.845	0.0313				
Total	29	0.893					

The hypothesis shows the f- calculated in Table 4.7 which is 0.773. Since the calculated f- ratio is below the f- critical of 3.35, the stated null hypothesis is accepted at 0.05 level of significant meaning there is no statistical significance difference in the mean responses of Automobile Technicians, Automobile Teachers and Automobile Lecturers on Battery and Charging System Diagnosis and Repair.

### Hypothesis III

HO<sub>3</sub>: There is no statistical significance difference between the mean responses of Automobile Technicians, Automobile Teachers and Automobile Lecturers on General Employability Competencies for Automobile Body Electrical System.

The result of the test of significance difference in mean responses of respondents on General Employability Competencies for Automobile Body Electrical System is presented in Table 4.8

**Table 4.8: One- way Analysis of Variance of the mean responses of the respondents on the General Automotive Body Electrical System Diagnosis**

Sources of variation	Df	Sum of Squares	Mean Sum of Squares	f- cal	f- critical	Significance	Decision
Between groups	2	0.00001569	0.000007845	0.00001456	3.62	NS	Accepted
Within groups	114	6.14	0.05385				
Total	116	6.14001569					

The hypothesis shows the f- calculated in Table 4.8 which is 0.00001456. Since the calculated f- ratio is below the f- critical of 3.62, the stated null hypothesis is accepted at 0.05 level of significant meaning there is no statistical significance difference in the mean responses of Automobile Technicians, Automobile Teachers and Automobile Lecturers on General Employability Competencies for Automobile Body Electrical System.

## **Findings**

The following are the findings of the study, based on the data collected and analyzed; they are highlighted based on the research questions posed on the study by the hypothesis.

### **Findings related to Occupational Competencies Needed by Automobile Electrical Systems' Technician in General Automotive Electrical System Diagnosis.**

1. Practices safe working habits in the workshop and make proper use of hand tools, power tools, equipment and measuring instruments.
2. Applies electrical theory; tests circuits using basic test equipment.
3. Completes work orders compliant with state standards.
4. Perform solder repair of electrical wiring damage in various automobile electrical parts.

### **Findings related to Occupational Competencies Needed by Automobile Electrical Systems' Technicians in battery and charging system diagnosis and repair**

1. Inspect, clean, distillation fill and replace the battery.
2. Disassembling the alternators, clean, inspect, test performance and assemble.
3. Perform alternator bench test.
4. Use hydrometer testing check and read the specific gravity of sulphuric acid.

**Findings related to the General Employability Competencies Needed by Automobile Technicians for Automobile Body Electrical System**

1. Self- Esteem
2. Integrity/ honesty
3. Consciousness
4. Work safety
5. Working well with fellow employees
6. Sociability
7. Conveying information one- to- one
8. Listening attentively
9. Self- management
10. Analyzing problems
11. Identifying problems
12. Establishing good rapport with subordinate
13. Ability to write report
14. Sorting out the relevant data to solve problems
15. Recognizing effect of decision to be made
16. Allocating time efficiently
17. Adaptability/ flexibility
18. Taking reasonable job related risk.
19. Managing/ overseeing several tasks at once.
20. Identifying political implications of the decisions arrived.
21. Assessing long term effect of decision.

## **Discussion of Findings**

The discussion of findings will be based on the research questions posed for the study by the hypothesis.

### ***Employability competencies***

In terms of basic skills with an average mean of 2.59, the study revealed that employers seek candidates who have a sound academic base in regard to speaking, reading, listening, writing and calculation. These skills are important to carry out duty especially production works and works which involve technological tools. For instance, according to De Leon and Borchers (1998), employers valued mathematical skills as the second most important skill especially where the skill was not provided by employers yet it is strictly required in the occupations. On the other hand, Mitchell (2001) stated that 80.6% of employers pointed out that they needed workers with basic mathematical skills. Besides that, a research done by Northern Virginia Community College (2000) stressed that employers give priority to mathematical skills and basic calculations at working such as the usage of mathematics in computers and calculators.

When it comes to the thinking skills, the study revealed that employers seek candidates who have the ability of seeing things in the mind's eyes, ability to make sound decisions, creative thinking. Learning and reasoning skills have an overall mean score of 2.35. Reasoning is truly significant to make quick decisions logically or to interpret certain operational situations and draw appropriate conclusions. The conclusions drawn should be based on thinking as well as other related considerations. Logical thinking is based on knowledge gained from experience and other reading materials and it empowers one to diagnose a given operational situation and draw desirable decisions.

Informational skills aid interpretation, communication, organization and maintenance of information. Acquisition and evaluation of information items has an overall mean score of 2.37. Ability to organize and maintain information was widely used in management. According to Zolingen (2000), skillful employees believed that the key to success at work place is the ability to protect information. It could, therefore, be stated that the work place requires a set of social skills that include information preservation.

Interpersonal skills, with an overall mean score of 2.45, include participation in a team work, teaching of others, negotiations, service and leadership. The ability to lead is very important in any occupation. This is because, according to the research done by Zirkle (1998), most vocational instructors stated that leadership skill is very important in schools curricula development as it prepares the graduates for employability. Besides, Gabriel (2000) mentioned: “16% of employers stated that the ability to lead is also very important, 29% said that it is important, and 41% said it is quite important to practice it in professions”.

The application of technology to perform tasks among employees who serve in the production field is very significant as contemporary industries used varied technologies to simplify operations. Bunn and Stewart (1998) stated that technocrats agreed with the fact that the possession of technological skills are crucial to employability considerations in modern industries. They also revealed that 91% of respondents, in their research work, mentioned that basic technological skills could assist in vocational practices. Similarly, De Leon and Borchers (1998) noted that 80% of employers mentioned that the application of technologies to carry out duties is highly required. In addition, according to Yahya Buntat (2004), the application of technologies, tools and systems in work is considered important and required by the industry.

The personal skills include self esteem, responsibility, sociability, self management, integrity/ honesty, consciousness, ability to work without supervision, work safety, participates

as a member of a team, adaptability/ flexibility has an overall mean score of 2.70. The ability to adapt in the working environment is a essential in occupations especially in industry as it involves many employees. Clarke (1997), clarified that employers need flexible workers who are able to face any challenges in workplace besides able to motivate themselves to get through those challenges. Verhaar and Smulders (1999) mentioned that working with various races, cultures and languages is challenging as employees must be willing to cooperate. The ability to give constructive feedback to others involves explaining the concept, risks and benefit to non-automobile electrical technicians as well as the ability to clearly explain a project scope, plan and expected cost and revenue as essential in any business (King Fisher, 2004).

The research findings also revealed that resource/ capability skill includes time management, material and facility management, human resource management and risk. Williams and Heins (1971) cited by Okwori (2004) define risk as the variation in the possible outcomes that exists in nature. Because the future is uncertain, what we expect to happen may not turn to be correct. Risk is ever present in all human affairs, be they economic, political, social or personal. Human activities are full of risk and uncertainty. The fact that the future cannot be predicted with certainty underlies the pervasiveness of risk.

### ***Occupational competencies***

The findings of the study indicated that practising of safe working habits in the Workshop is a practical guaranty to prevent injury from the use of electrical substances, equipment or machines under specified conditions. Suruda, (1988) stated that “electrical hazards such as electrical shock occurs when the human body comes in direct contact with an electrical current or in contact with a piece of machinery or a tool that is in direct contact with an electrical current and the electrical current follows the body as a path to the ground”. Therefore, it is very important to make proper use of safety devices such as hand tools, power tools, and equipment,

machines and measuring instruments. Other safety findings include application of appropriate electrical theories; circuit tests using basic testing equipment and the completion of work orders in compliance with the operational standards like soldering repair of electrical wiring damages in various automobile electrical parts among others.

On battery and charging system diagnosis and repair, the findings of the study indicated that checking of service information is very vital for safe and accurate procedures to follow when replacing certain automobile components. For instance, inspecting, cleaning and filling of battery components such as the battery hold-down clamps/brackets, filler cap(s), battery electrolyte level, corrosion on battery terminals/cable ends and such other operations like the filling of the battery with distilled water; ascertaining the state of charge of a lead-acid battery among others require the application of appropriate tools and observance of precise procedures. A hydrometer calibrated to read specific gravity relative to water at 60° Fahrenheit is a standard tool used for checking the relative gravity of battery electrolyte while tables are used to correct the reading to the standard temperature. The research also revealed that the alternator is one of the main components of charging system and has to be replaced or repaired using the service- information. Once the alternator has been repaired, it is clamped in the relevant test set-up on a combination test bench before being installed in the vehicle. The alternator can be tested directly in the vehicle by visual inspection which is first carried out to check the V- belt, the wiring, and the charge indicator lamp. Basically, an engine analyzer and a volt- ammeter are required for the electrical tests (Reinhard, 2002).

For the starting system, an idle starter solenoid does receive a large electric current from the car battery and a small electric current from the ignition switch. When the ignition switch is turned on, a small electric current is sent through the starter solenoid. This causes the starter solenoid to close a pair of heavy contacts, thus relaying a large electric current through the starter



motor, which in turn sets the engine in motion (Stuttgart 1996). The starter motor is a series-wound direct current electric motor with a solenoid switch (similar to a relay) mounted on it. When low-current power from the starting battery is applied to the starter solenoid, usually through a key-operated switch, the solenoid closes high-current contacts for the starter motor and it starts to run. Once the engine starts, the key-operated switch is opened and the solenoid opens the contacts to the starter motor. If a starter solenoid receives insufficient power from the battery, it will fail to start the motor, and may produce a rapid clicking sound. The lack of power can be caused by a low battery, corroded or loose connections in the battery cable, or a damaged positive (red) cable from the battery. Any of these problems will result in some, but insufficient, power being sent to the solenoid, which means that the solenoid will only begin to push the engagement gear, making the metallic click sound. Starter solenoid problems are best diagnosed by an experienced auto-electrician. The findings also revealed that when repairing the starter motor, the starter pinion should be checked for damages such as broken teeth, excessive wear among others and replace if necessary using the alternator testers and coil winding short-circuit detectors in conjunction with relevant servicing instructions. The starter-motor testing procedure essentially consists of two parts viz; testing the starter motor under no-load conditions. The criteria for this part of the test are that the starter-motor current remains below a specified threshold and the motor speed reaches a minimum level when under no-load. The short circuit test involves braking the starter motor to a standstill using the drum brake built into the test bench.

The lighting and accessories system of a motor vehicle consists of SRS air bag, radio, lighting and signalling devices mounted or integrated to the front, sides, rear, and in some cases the top of the motor vehicle. The purpose of this system is to provide illumination for the driver to operate the vehicle safely after dark, to increase the conspicuity of the vehicle, and to display

information about the vehicle's presence, position, size, direction of travel, and driver's intentions regarding direction and speed of travel.

## CHAPTER V

### SUMMARY, CONCLUSION AND RECOMMENDATION

#### Summary of the Study

Automobile is a branch of mechanical engineering that deals with the practical application of physics and material science for analysis, design, manufacturing and maintenance of mechanical systems. The Occupational and Employability Competencies Needed by Automobile Systems' Technicians will help in bringing out the necessary skills required of every graduate of automobile technology for gainful employment in automobile and related industries.

The purpose of the study is to identify the occupational competencies needed by Automobile Electrical Systems' Technicians in general automotive electrical system diagnosis, battery and charging system diagnosis and repair, starting system diagnostic and repair, lighting and accessories system diagnosis and repair and the general employability competencies needed by automobile electrical systems' technicians.

The study is aimed at finding the solution(s) to the shortcomings of the current curriculum in the training of Automobile Electrical Systems' Technicians such that it will meet the desperate needs and expectations of both the employers and employees at the workplace.

Survey approach was used to develop the study. The questionnaire developed for this research was validated by three lecturers, two lecturers from the department of Industrial and Technology Education of Federal University of Technology, Minna and one from the department of Automobile Technology of the Niger State College of Education, Minna. Eighty-one (81) validated items are used for the study. The validated instrument was a structured questionnaire prepared for 40 Technicians, 26 Teachers and 23 Lecturers of Automobile Technology

respectively. The instrument was analyzed using frequency count, mean, and analysis of variance. The research questions were formulated and answered and the following findings based on the research questions posed on the study by the hypothesis; Practices safe working habits in the workshop and make proper use of hand tools, power tools, equipment and measuring instruments, applies electrical theory; tests circuits using basic test equipment, disassembling the alternators, clean, inspect, test performance and assemble, perform alternator bench test, use hydrometer testing check and read the specific gravity of tetraoxosulphate(ix)acid (sulphuric acid), honest, self esteemed, responsible, sociable, self-managers, alert and punctual workers and adaptive, flexible as well as safety consciousness.

### **Implications of the Study**

The implications of the study regarding; occupational and employability competencies needed by Automobile Electrical Systems' Technicians in the areas of battery and charging system, lighting and accessories, starting and general automotive system diagnosis should be taught right from schools. Acquisition of these skills will afford the students the opportunity to work in any automobile and related industries. The implication of this finding is that if students are not prepared with the skills during training, they will not fit to work in any automobile or related industry, thereby creating unemployment among the graduates that are skill-handicapped in the field.

Another finding of this study regarding occupational competencies in tools handling and its areas of application is that the students should be familiar with different tools and demonstrate how they can be applied in various conditions in the work place. Tools identification by students is very necessary as it enhances their competencies. The implication of this is that if students are

not familiar with the tools and how it is being used, they will use wrong tools for wrong job and hence; the aim of the training might not be fully achieved.

The finding of this study with regard to the employability competencies showed that students are meant to be honest, self esteemed, responsible, sociable, self-managers, alert and punctual workers and adaptive, flexible as well as safety consciousness. The implication is that without right attitude to work, acquisition of more technical know-how they would neither be competent nor employable. Hence the acquisition of such good attitudes by students of automobile will be key to successful employment.

The finding of this research work with regards to communication skills is that the students of automobiles should be able to communicate verbally with clients, speak properly and be able to address various groups of people in their working places. The automobile students use the communication skills of listening, talking, reading and writing almost every moment of their work because the skills help them towards solving mechanical problems. Personality development is also dependent upon good communication skills. Therefore, the implication of this to the students of automobile is that students who cannot speak and communicate properly would always use a wrong language in their various working place.

## **Conclusion**

Based on the findings of the study, it was analyzed that there is the need for Automobile Technicians to be well equipped with occupational and employability competencies by means of engaging in various practical activities which will prepare them to be fit to work in any automobile and related industry. In effect, the results of this study will provide answers to the occupational and employability competency problems encountered by Automobile Electrical Systems' Technicians.

## **Recommendation**

Based on the findings of the study and their implications, the following recommendations were made:-

1. There should be a review of the Automobile Electrical Systems' Technicians training programmes to ensure that they are competent and employable in the automobile and related industries.
2. Given the evolution of industrial and labour laws, there should be regular and systematic evaluation of teaching curricula, taking into account the industrial and employers' requirements.
3. The roles, responsibilities, and ethical obligations of employees in the industry should be adequately communicated to the students during training.

## **Suggestion for further research**

Based on the findings of this research study; the following suggestions were made for further research:-

1. Reconceptualization of Nigerian vocational and technological education for emerging globalization, relevant and sustainable economic development.
2. The effectiveness of government legislation in reducing the incidences of workplace accidents and other health and safety risks

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