PRACTICAL SKILL ACQUISITION ENHANCEMENT NEEDS OF METALWORK TECHNOLOGY EDUCATION STUDENTS FOR IMPROVED JOB PERFORMANCE IN WELDING IN MINNA METROPOLIS

BY

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2016/1/63818TI

DEPARTMENT OF INDSUTRIAL AND TECHNOLOGY EDUCATION

SCHOOL OF SCIENCE AND TECHNOLOGY EDUCATION

FEDERAL UNIVERSITY OF TECHNOLOGY MINNA

APRIL, 2023

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A RESEARCH PROJECT SUBMITTED TO THE DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION,

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IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF

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TECHNOLOGY EDUCATION

APRIL, 2023

DECLARATION

I, ANIMASAHUN, Yusuf Tosin with matriculation number 2016/1/63818TI, an undergraduate student of the department of Industrial and Technology Education, certify that the work embodied in this project is original and has not been submitted in parts or full for any other diploma or degree of this or any other University.

…… ……

Name and Matric No. Sign and Date

CERTIFICATION

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

Dr. A. B. Kagara ……

Project Supervisor Signature and Date

Dr. T. M. Saba ……

Head of Department Signature and Date

…… ……

External Examiner Signature and Date

DEDICATION

This project is dedicated to Almighty Allah who gives me the opportunity to successfully complete it, for without Allah this cannot be successfully done and to my parent Mr and Mrs Animasahun Is'haq whose their prayers and support have been backing me up also to friends and family members.

ACKNOWLEDGEMENT

My profound gratitude goes to Almighty Allah who spare my life and who guides me throughout my academics years through his infinite blessings, I would like to extend my sincere gratitude to my research supervisor, Dr. A.B Kagara, for his sincere guidance and enormous patient and for overlooked my shortcomings and supported me like his son whenever and wherever the support is needed throughout the course of this project. Also my acknowledgement goes to Prof B.N.Atsumbe indeed you are a father to us, Prof I.Y. Umar, to my H.O.D. Dr T.M. Saba and to all the lecturers and staff for their contributions for attain this stage successfully.

My most special gratitude goes to my parent Mr. and Mrs. Animasahun Is'haq for all they've done for me; words can't quantify the magnanimity of the role they've played in my life. Also, I relay my most sincere appreciation to my siblings, cousins and friends for the tremendous contribution they've made to my life.

Finally, I thank the almighty Allah for seeing me through this journey from the inception to this point of delivery. Alhamdulillah!

ABSTRACT

The study determine practical skill acquisition enhancement needs of metalwork technology education students for improved job performance in welding in Minna Metropolis. Three research questions and three null hypotheses were answered and tested respectively at 0.05 level of significance. Related literature were reviewed. The study adopted descriptive survey research design. There was no sampling since the population was manageable. A structured questionnaire was developed by the researcher and used for data collection, the instrument was face validated and pilot tested before it was used for data collection. Cronbach Alpha reliability method was used to determine the internal consistency of the items and a reliability coefficient of 0.75 was obtained. Data collected was analyzed using Statistical Package for Social Sciences (SPSS) version 23 and t-test was used for analysis. The findings revealed that most of the respondents agreed with the mean average 2.66-3.22 on the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment. It was also revealed that all the respondent agreed with the mean average from 2.50-3.33 on the electric arc welding skills metalwork technology education students are deficient for sustainable employment Based on these findings it was recommended that the administrators should know how to manage and tackle the challenges facing Welding and Fabrication. It was also recommended that technicians who want to enrich themselves with skills in metalwork should learn how to manage all kinds of tools and equipment in welding and fabrication.

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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the Study

Technical and vocational education is defined as those aspect of education involving in addition to general education, the study of technologies and related sciences and the acquisition of practical skills, attitude, understanding and knowledge relating to occupation in various section of economic and social life (Federal Republic of Nigeria, 2014). Technical vocational education is define according to Akerele (2017) as that aspect of education that exposes the learner to the acquisition of demonstration benefits and sustainable lively hood. The national policy on education has placed a premium on vocational and technical education in view of its important role in technological and industrial development of Nigeria. It is recognized as that aspect of education which leads to the acquisition of practical and applied skills as well as basic scientific knowledge (FRN, 2014).

Also Oni (2017) described technical vocation education as that type of education which fits the individuals for gainful employment in recognized career as semi-skilled workers or technicians or sub professionals. According to Audu (2013), any form of education that is geared towards teaching technical skills and attitude suitable to such skill can be regard as technical vocational education. Tilak (2015), emphasized that technical vocational education if well planned and coordinated will guarantee student with skills, increase production process resulting from technological advancement. The nature of the demand for skills both in the quality and quantity help in promoting the need for vocational and technical education.

Technical colleges in Nigeria have been training people to become craftsmen and technicians. Training qualifies them for jobs both in public and private sectors of the economy. Both sectors, according to Ndomi (2014), require well trained and competent technicians who can operate and maintain the available technical equipment. According to Nigeria policy on

education (2004), technical education is that aspect of education which leads to the acquisition of practical skills in metal construction, foundry, interior decorations, carpentry, and joinery as well as basic scientific knowledge. Therefore, there is an ardent need for qualities technical college for acquiring the desired knowledge (education) and training to produce graduates that can perform competently in their chosen vocation without a need for pre-employment training. The major goal of vocational institutions is to prepare students for successful employment in the labour market (Finch, 2019). This condition can be met through a curriculum that is relevant and comprehensive with relevant training of students in skills acquisition in their technical trade areas for future development of the key sector of the economy in order to meet the basic needs of electricity, roads and machinery among others.

Students of metal work technology courses such as welding and fabrication are an important part of the curriculum in technical colleges, but a supportive school environment is a fundamental requirement for the successful implementation of the curriculum (Bybea and loucks-Horsley, 2018) . This aspect of the curriculum can only be implemented where facilities in the workshops are adequate and relevant. Availability of appropriate faculties enhance student learning by allowing them to be involved in demonstrations, and practice will continue to build their skills. According to leigh and Kidd (2018), there are certain things the trainer or teacher must do as well as the student which may involve careful planning of his activities for effective learning.

The technical colleges play vital roles in Nigeria. They train and produce technicians for industry, they impart vital technical skills in the youths, they help towards the goal of self employment and job creation and in the struggle towards technological advancement and acquisition. Through the Technical colleges, youths acquire such skills as skilled technicians: bricklayers, carpenters, painters and auto mechanics; laboratory and pharmacy technicians, electrical/electronic technicians and skilled vocational nurses.

Welding is one of the various areas of specialization in metal work technology. Metal work technology is the totality of all the process involved in the production of metal objects. Other areas of metal work are: fitting and machinery of mechanical production which deals with the use of machine tools or hand tools to produce fabricated metal components and articles like funnels, water cans, containers for putting beverages and others welding projects, which is concerned with joining of two or more pieces of metal together with the aid of heat and welding rod: foundry which deals with castings of metal into various shapes forging which is the process of heating metal pieces to a certain temperature and hammered to a required shapes. On completion of welding and fabrication the students will be able to understand workshops safety rules and their application in machine shop, from the physical properties manufacturing process and application of ferrous and non-ferrous metals in common use. Select and use common measuring, marking out, cutting and striking tools. Understands the basic working principles of drilling machine and be able to use it for various types of screw treads rivets and be able to rivet and cut screw by hand, understand the application of various types of screw threads and rivets cut screw by hand, understand the 150 system of tolerance and fits, and their application in engineering production, produce simple engineering component on the bench, understand the essential features and working principles of the center lather and carry out basic operations such as turning, stepped turning, facing , taper turning, knurling and undercutting. Also on completion of the course, the students will be practically competent. Use all tools correctly ensuring the machinery guards and protective eye shield are use at all times, comply with the general rules for safe practice in the work environment at all times. Use and select hand tools for carrying out various bench fitting and assembly tasks, tools, hacksaws, taps, reams, drills, dividers, surface gauge, produce thread using tap and dies, correctly grind chill point angles, drills, twist and flat drills, select and set drilling machine speeds to carryout a range of operations using the appropriate coolants:

drilling, reaming, counter sinking, counter boring, paton metal joining by a range of processes. Cut through the joints and investigate the depth of penetration of the metals at the interface. Process: soldering, brazing and fusion welding and mark out on other materials, datum lines, angles, radial circles and hole positions without mastering the skills that will scale them through the labour market successfully. With the low level of skill acquisition there is great fear of failure that prevents an individual venturing into unfamiliar ground.

Ezekwu (2015), also observed that the practical training given to welding and fabrication students may not be sufficient for them to become self-reliant, he claimed that what we are practicing now is for examination purpose to attain a certificate of education, hence there are many employees that cannot face the challenges of the task, they use engage to handle. A metal work technology graduate can only become self-employed if he is practically balanced with good entrepreneurial initiatives. The labour market has become saturated and metal work technology graduate float the streets without government paid jobs majority of these graduate are without sufficient practical skills and entrepreneurial initiatives to make them establish a workshop of their own. They have faces that clearly spelt out frustration, dejection and hopelessness.

Akale, (2014), observed that the infusion of entrepreneurial education in N.C.E technical curriculum is a reaction to the escalating incidence of graduate's unemployment. The goal of entrepreneurial skills is to orient student towards self reliance. Welding and fabrication training will be directed towards more practical oriented society with more entrepreneurship and practical computer training. Aina (2016) noted that the techniques of teaching used by teachers do not encourage initiative among students. He equally added that many technical teacher are not willing to accept change in method of teaching technical subjects. However it was observed that performance of student, particularly those that in the welding. Ehiametalor and Sofolahan (2016) observed that there is not enough vocational required skill, to teach in

the vocational and technical school and such is constituting a serious draw back in the development of technical colleges.

Again Nzelum (2014) remarked that buildings and well equipped workshop are of paramount importance in the institution of learning unfortunately the same cannot be seen of most of Welding and fabrication workshop in technical colleges of Niger state. From the foregoing, it can be said that some technical colleges in Nigeria are faced with problem of teaching and learning technical subject particularly in Welding and fabrication technology because of lack of trained teachers, training facilities as well as poor teaching method.

1.2 Statement of the Problem

The issues confronting the teaching and learning of welding are enormous. For instance, Musa'az (2014) said that the problem being faced in Nigeria educational system include the storage and maintenance of tools and equipment, classroom furniture, trained and supportive staff and supply of enough equipment.

However, due to the lack of training, workshops facilities and materials as well as obsolete equipment in most of technical schools for students affect their ability to possess the practical skills for welding, the teachers of welding technology found it difficult to actualized the objective of welding as highlighted by the National Policy Education. These contribute to the low skills of the student in the welding. From the above it seems that the performances of student in welding in technical schools could be affected by inadequate instructional materials, facilities/ equipment and appropriate methods of teaching. In view of the foregoing observations therefore it becomes necessary to determine skill acquisition needs of metalwork Technology education students to enhance their performance in welding and fabrication in Minna metropolis.

1.3 Purpose of the Study

The purpose of the study is to determine practical skill acquisition enhancement needs of metalwork technology education students for improved job performance in welding in Minna Metropolis. The specific objectives of the study are to determine;

1. electric arc welding skills needed by the metalwork technology education students for sustainable employment.
2. oxy-acetylene welding skills metalwork technology education students are deficient that negate sustainable employment?
3. factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment

1.4 Research Questions

The following questions guided the study:

1. What are the electric arc welding skills needed by the metalwork technology education students for sustainable employment?
2. What are the oxy-acetylene welding skills metalwork technology education students are deficient for sustainable employment?
3. What are the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment?

1.5 Significance of the Study

The finding of this study will be of benefit to the following set of people: Students, teachers, school administrators and the government.

The students will benefit because the problem facing the teaching and learning of welding and fabrication will be identified and consequently tackled. The welding and fabrication skills be used by employers or interested group of people to train the students in order to acquire

necessary skills and competencies needed. These students after acquiring the necessary skills and competencies to secure employment in metalwork industries and earn a lot of money to take care of themselves and families.

The teachers will benefit because the findings of the study will help enlighten them on ways of improving on their teaching methods. The skills could be used to build the capacity of instructors and interested technicians in welding and fabrication. The training of instructors and technicians will enrich their knowledge and skills in welding and fabrication and they will be able to implement the knowledge acquired from training in classrooms and workshop settings. welding and fabrication skill will be serve as already made training package for instructors and technicians because there will no need of compiling lecture notes before they teach their students.

The school administrators will benefits because they will now know how to manage and tackle the challenges facing Welding and Fabrication. if welding and fabrication skill is integrated into the curriculum of tertiary institutions in Nigeria.

The findings of the study will benefit the technicians who want to enrich themselves with skills in metalwork. The technicians will find the study helpful because it will teach them how to manage all kinds of tools and equipment in welding and fabrication.

The finding of this study will avail the government information in the state of technical college in the state and hope filling encourage them provide the necessary infrastructure, equipment and training materials that are basic requirement for learning.

The findings of the study will also benefit the curriculum planners and developers. The welding and fabrication skill needed which is the product of findings could be integrated to curriculum of technical colleges by government to prepare students. National Board for Technical Education can also adopt welding and fabrication skill needed for integration into the programmes of polytechnics in Nigeria without carrying out fresh empirical studies.

Educational researchers will also find this work useful. They could use the updated manuals to teach their trainees/students for better performance in their jobs.

1.6 Scope of the Study

The study is limited to practical skill acquisition enhancement needs of metalwork technology education students for improved job performance in welding in Minna Metropolis. The objectives of the study is to determine electric arc welding skills needed, the deficiency in skills needed and the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment. The study will cover Metalwork Technology Education students in Niger state. The duration of the study will be covered in six (6) weeks.

1.7 Hypotheses

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

HO_1: There is no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on electric arc welding skills needed by the metalwork technology education students for sustainable employment.

HO_2: There is no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on oxy-acetylene welding skills metalwork technology education students are deficient for sustainable employment.

HO_3: There is no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment.

CHAPTER TWO

2.0 LITERATURE REVIEW

The following sub-headings are explained under this chapter which extensively examines literature that are associated and significant to the subject of this study, which are as follows;

2.1 Theoretical Framework

2.1.1 Skill Acquisition Theory of development

Robert DeKeyser (2007) noted that the Skill Acquisition Theory of development has three stages: declarative, procedural, and automatic (from ACT-R Theory). Declarative knowledge refers to explicit knowledge about a topic, as in "knowing" and talking about grammar rules. Procedural knowledge is implicit knowledge that refers to behaviour, such as speaking or writing a language. Of course, there are different levels of proficiency in using a language, and thus automaticity is not an "all-or-nothing affair". Automaticity occurs toward the endpoint of extensive practice, toward the point at which one has become completely fluent in a language. From the perspective of SAT, the sequence of these stages is crucial, as is the appropriate combination of abstract rules and concrete examples at the declarative stage. According to DeKeyser,(2007) skill Acquisition Theory does not explain all of language learning and apparently is most effective at beginner levels. He states that SAT works best with:

1. High-aptitude adult learners engaged in the learning of simple structures
2. fairly early stages of learning
3. instructional contexts

It seems obvious that young children will not respond as well as adults to the use of declarative knowledge as their ability to understand rules and explanations is more limited. Conversely, as rules become more complex, they may become too difficult to

understand in the form of declarative knowledge. Thus, it's possible that learning (or acquiring) complex rules may rely more upon implicit processes. Anderson and Schunn (2006) say something similar: As knowledge domains become more advanced, their underlying cognitive structure tends to become more obscure. Thus, while it may remain easy to provide feedback on what the final answer is, it becomes difficult to provide feedback on the individual mental steps that lead to the final answer. Teachers often are unaware, at an explicit level, of what this knowledge is and do not know how to teach it to children. Anderson and Schunn (2006) are pointing to the need to diagnose a task and break it down into its components in order to provide effective feedback. When we can't componentialize a task, then feedback becomes considerably less effective. Thus, with respect to error correction, we need;

1. rules that are not obscure,
2. examples of the rules
3. Understandable explanations of those rules.

The ability to use declarative knowledge in the learning process does not accelerate acquisition. Rather, it eliminates wasted time and effort

2.1.1.1 Skill Acquisition: Measurement, Theory, and Research

In today's increasingly technical world, many jobs require the acquisition of a variety of simple and complex skills, for instance (Lane, 1987). However, the problems associated with how one acquires a skill are numerous and complex (Robb, 1972). An important aim of many training programs is to develop in trainees the capability to perform complex "real world" tasks, with a minimum investment of resources. Training could aim to raise the level of performance, and minimise the range of individual differences in performance, by revealing which abilities influence learning, and other possible moderating variables,

(Ackerman & Kyllonen, 1991) and to identify the differing needs of trainees at different stages of practice, so that training programs can keep pace with different ability require stages (Mumford *et al.*, 1994). Different theories and the precise measurement of skill acquisition are vital for ensuring the optimal application of training programs in the wide variety of settings that exist.

Ackerman's (1988) theory describes the relation of ability classes to phases of skill acquisition, and can be used to predict the association between individual differences in performance across levels of skill. The theory proposes that in the initial declarative stage of skill acquisition (general ability), substantial demands are made on cognitive abilities such as memory, reasoning, and knowledge retrieval (Ackerman, 1988). Ackerman (1989) has shown how those with a higher general intellectual ability (which is equated with resource availability) demonstrate higher levels of performance early in practice. As practice progresses, measures of intellectual Skill Acquisition ability become less related to task performance, a finding which is consistent with the development of resource independence. That is, resource availability has less importance in the final stage of skill acquisition. The associative stage (perceptual speed) is when learners develop rules for performance. Performance is more reliant on perceptual speed ability than general abilities; with attention load reduced (Ackerman, 1990). In the autonomous phase (psychomotor ability), the individual has essentially automatised the skill, thus performance is fluent and relatively free of attentional demands (Ackerman, 1990).

Recently Kanfer (1989) and Lane (1987) have suggested that individual differences in learning and performance can't be solely explained by individual differences in cognitive abilities. Kanfer and Ackerman (1989) have proposed a model of ability-motivation interactions for attentional effort, which assumes that changes in the amount of capacity used, and policies for allocation of attention, are accomplished through motivational processes.

Kanfer and Ackerman's (1989) model describes how motivation, abilities, and information processing constructs operate simultaneously to affect learning and performance (Kanfer, 1990).

2.2 Conceptual Framework

2.2.1 Metalwork Technology Education

Technical Education which metalwork is aimed at introducing the relationship between individuals that are provided at this level are aimed at creating an awareness or orientation so that they can make better regarding their future occupation. Activities in such programmes are centered on their immediate environment and should include the home, the school and their understanding through experiences, (Aluwong, 2017).

The National Policy on Education NPE (2004) emphasized the production of teachers with the intellectual and professional skills adequate for carrying out their primary assignments, and to make them adaptable to any changing situation not only in the life of their country but also in the whole world. The broad objective of teaching metalwork technology education as enshrined in the National Policy on Education is highly appreciated. Among which are acquisition of appropriate skills and development of mental, physical and practical skills abilities and competencies as equipment for the individual to live in and contribute to the development of the society.

The metalwork teacher is the manager for the learning resources, creating enabling learning environment in his class with a view to achieving technical objectives (Abdulhamid, 2016).

Abdulhamid (2016) stated that metalwork teacher can do careful selection of his teaching and learning strategies, sequencing and structuring of his subject matter so that the learner can readily grasp it. According to Allison (2017) the teacher is a guide, This suggests that every teacher that teaches metalwork must clearly understand that teaching of the subject is not just

away of imparting information but also guiding the students in to the unknown. This will give the learner a firm grip of the practical and applied skills and the subject matter as much as possible. Hence the teacher should shoulder the responsibility of developing the potentials inherent in all the learners. According to Mac Greedy (2015) all learners are created creatively, but it are the teachers responsibilities to discover and nurture this great potentials inherent in them. The metalwork technology teacher therefore, is a crucial component of any educational system because no organized learning can take place without teachers.

2.2.2 Goals of Metalwork Technology Education

The goals of technical education of which metalwork is among as stipulated in the National Policy on Education (NPE 2004) are:-

1. To cultivate inquiring, knowledge and rational mind for the conduct of a good life and democracy.
2. To produce scientists for national development.
3. To service studies in technology and the cause of technological development
4. To provide knowledge and understanding of the complexity of the physical world, the forms and the conduct of life.

In pursuance of these goals, the Federal Government stated that metalwork teachers should emphasized the teaching and learning of these processes, and principles at all levels of education. Special provision and incentives should be made for this study at each of the national education system. The government also stated that the study of metalwork should be popularized to enhance the production of adequate number technological personnel to inspire and support national goal.

Metalwork technology is an activity of making objects with substance that is opaque, fusible, ductile, good conductor of heat and electricity, for cations by loss of electrons and yields basic oxides and hydroxide. According to Kevin, (2014), metalwork is an activity of making objects out of metal in an artistic and skilful way. Technology in the other hand involves the methods and process what they eat, drink, wear, and provide shelter for themselves communicate with one another and a host of others. In the same vein technology according to Nwaokolo (2017) is a systematic application of the knowledge of science to practical tasks in industry, the know-how of doing things. He further defined metal technology as an application of scientific way. It is the totality of all the process involved in the production of metal articles Nwaokolo (2017).

Technology education as an aspect of metalwork can be seen as an education to earn a living in an occupation in which success is dependent largely upon technical information and understanding of the laws of science and principles of technology as applied to modern designs production, distribution and services.

2.2.3 Antecedents of Metalwork Technology Education

Metalwork trades are the various area of specialization in metalwork technology. Metalwork technology is the totality of all the process involved in the production of metal articles. The areas of metalwork technology are: Fitting and machining of mechanical production which deals with the use of machine tools or hand tools to produce fabricated metal components and articles like funnels, water cans, containers for putting beverages and others welding, which is concerned with joining of two or more pieces of metal together with the aid of heat and welding rod; Foundry which deals with casting of metals into various shapes forging which is the process of heating metal pieces to a certain temperature and hammered to a required shapes.

Yusuf, (2015) observed that the beneficiaries of metalwork technology education pass through institutions without mastering the skills that will scale them through the labour market successfully. With the low level of skill acquisition there is great fear of failure that prevents an individual from venturing into unfamiliar grounds. Ezewu, (2014) also observed that the practical training given to metalwork technology students may not be sufficient for them to become self reliant, he claimed that what we are practicing now is for examination purpose to attain a certificate of education. Consequently, many that have graduated can not defend their certificate, hence, there are many employees that can not face the challenges of the task, they were engaged to handle. A metalwork technology graduate can only become self employed if he is practically balanced with good entrepreneurial initiatives. The labour market has become saturated and metalwork technology graduates float the streets without government paid jobs majority of these graduates are without sufficient practical skills and entrepreneurial initiatives to make them established a workshop of their own. They carry faces that clearly spelt out frustration, dejection and hopelessness.

Akale, (2014) observed that the infusion of entrepreneurial education in NCE Technical curriculum is a reaction to the escalating incidence of graduates unemployment. The goal of entrepreneurial skills is to orient students towards self reliance. Metalwork training will be directed towards more practical oriented society with more entrepreneurship and practical computer training, the problems facing metalwork technology graduates will be minimized. Oladiji, (2018) also observed that instructional methods relevant to the teaching of metalwork are practical projects, discussions, excursion or trip and homework he further explained that lecture method might be used effectively, since the objectives is specifically to train personnel who will eventually be useful in the production line industry or set up their own business.

2.2.4 Problems Facing Metalwork Technology Education

Although this form of education was given adequate recognition in the (NPE 1998). The policy provided a basis for its recognition and effective implementation. otherwise, the situation on ground does not only discourage technical education, but in addition frustrate those already in it. Because of the neglect of these forms of education for very long time and the inferiority complex associated with it in the past, students consider it the ultimate alternative. This can be supported as opined by Olagunju, (2017) who stated that my entrance into technical profession was not intentional, but rather as a result of frustration and inability to pursue the desired University Degree programme due to lack of academic requirements Another problem identified is on inadequate metalwork technology educations, this problem need serious and urgent attention because technical educators are the main catalyst of education productivity. Oga, (2013) observed that in Nigeria the problem of inadequacy of metalwork technology educators and other related courses both in quality and quantity has been with us for decades. Most of the new metalwork technology educators available are of poor quality either because they have nor been trained well, less commitment to duty, frustrated on the job or because they have no facilities to work with. At present, professional teachers are insufficient in our institutions of learning and so, non professionals often referred to as "Quacks" find their way into teaching profession thus contributing in producing non-practicing metalwork technology education teachers.

2.2.5 Concepts of Skill

Skill has been defined by Adams (2013) as a large behavioural domain, which can be learned, and usually involves a combination of cognitive, perceptual and motor processes. Since the 1960's there have been several attempts to develop theories that predict the relative importance of different cognitive and intellectual abilities over the course of task practice

(Ackerman & Woltz, 1994). There is a general consensus in the literature that the learning of a complex task proceeds in accordance with approximate segments of practice and that there are three stages in this process. Most of the information-processing theories have approached skill acquisition as a process which begins with resource-dependency and ends in skilled performance or automaticity. Edwin Fleishman has been a prominent figure in the last fifty years in the domain of motor skill acquisition and abilities. Fleishman (2016) proposed that during perceptual motor tasks, cognitive abilities may be good predictors of performance early in learning, but with continued practice the influence of motor abilities increases. With the attainment of skilled performance, Fleishman proposed that an ability factor specific to the task itself becomes the primary determinant of performance.

Udo (2016) opined that skills can not be taught by lecturing alone. This is because metalwork technology training is mostly concerned with doing things practically and therefore the most effective medium is that which presents the syllabus in the most practical useful way. This will enhance the development of practical skills leading to self-employment through exposure to the metalwork equipment. Lack of curriculum implementation. The prescribed curriculum may be analyzed as impressive and contain all the important skills to be acquired, however, implementation remains questionable. Technical education curriculum prescribed skills acquisition that can lead to self employment. The extent to which the prescribed curriculum has succeeded half way in attaining the needed technical skills. The attitudes of some metalwork students towards the skills content of the curriculum seem to be very poor for a long time. In addition, most of the students in metalwork technology education in Nigerian tertiary institutions are with less interest in manual skills as contained in the curriculum, because of their envious attitudes towards their colleagues in liberal arts going about with long ties round their necks. Such attitudes can result to poor performance of students in their practical work.

2.2.6 Importance of fabrication and welding

Welding is a process of permanent joining two materials (usually metals) through localized coalescence resulting from a suitable combination of temperature, pressure and metallurgical conditions. Depending upon the combination of temperature and pressure from a high temperature with no pressure to a high pressure with low temperature, a wide range of welding processes has been developed (American Welding Society, 2015).

2.2.6.1 Classification of Welding Process

American Welding Society (2015) classified the welding processes as differ in the manner in which temperature and pressure are combined and achieved. Welding Processes can also be classified as follows (based on the source of energy):

1. Gas Welding

- Oxyacetylene
- Oxy hydrogen

2. Arc. Welding

- Carbon Arc
- Metal Arc
- Submerged Arc
- Inert-gas-Welding

3. TIG and MIG

- plasma Arc
- Electro-slag

4. Resistance Welding

- Spot
- Seam
- Projection
- Butt Welding
- Induction Welding

5. Solid State Welding

- Friction Welding
- Ultrasonic Welding
- Explosive Welding
- Forge and Diffusion Welding

6. Thermo-Chemical Welding

- Thermit Welding
- Atomic H2 Welding

7. Radiant Energy Welding

- Electron Beam Welding
- Laser Beam Welding

In order to obtain coalescence between two metals there must be a combination of proximity and activity between the molecules of the pieces being joined. Sufficient to cause the formation of common metallic crystals. Proximity and activity can be increased by plastic

deformation (solid-state welding) or by melting the two surfaces so that fusion occurs (fusion welding). In solid-state-welding the surfaces to be joined are mechanically or chemically cleaned prior to welding while in fusion welding the contaminants are removed from the molten pool by the use of fluxes. In vacuum or in outer space the removal of contaminant layer is quite easy and welds are formed under light pressure.

Condition for Obtaining Satisfactory Welds

To obtain satisfactory welds it is desirable to have:

- A source of energy to create union By fusion or pressure
- A method for removing surface contaminations
- A method for protecting metal from atmosphere contamination
- Control of weld metallurgy

Source of Energy

Energy supplied is usually in the form of heat generated by a flame, an arc, the resistance to an electric current, radiant energy or by mechanical means (friction, ultrasonic vibration or by explosion). In a limited number of processes, pressure is used to force weld region to plastic condition. In fusion welding the metal parts to be joined melt and fuse together in the weld region. The word fusion is synonymous with melting but in welding, fusion implies union. The parts to be joined may melt but not fuse together and thus the fusion welding may not take place.

Importance of Welding

Welding is used as a fabrication process in every industry large or small. It is a principal means of fabricating and repairing metal products. The process is efficient, economical and

dependable as a means of joining metals. This is the only process which has been tried in the space. The process finds its applications in air, underwater and in space.

Applications of Welding

- Welding finds its applications in automobile industry, and in the construction of buildings, bridges and ships, submarines, pressure vessels, offshore structures, storage tanks oil, gas and water pipelines, girders, press frames, and water turbine.
- In making extensions to the hospital building, where construction noise is required to be minimum, the value of welding is significant.
- Rapid progress in exploring the space has been made possible by new methods of welding and the knowledge of welding metallurgy.
- The process is used in critical applications like the fabrication of fission chambers of nuclear power plants.
- A large contribution, the welding has made to the society, is the manufacture of household products like refrigerators, kitchen cabinets, dishwashers and other similar items.
- It finds applications in the fabrication and repair of farm, mining and oil machinery, machine tools, jigs and fixture, boilers, furnaces, railway coaches and wagons, anchor chains, earth moving machinery, ships, submarines, underwater construction and repair.

Selection of a Welding Process

Welding is basically a joining process. Ideally a weld should achieve a complete continuity between the parts being joined such that the joint is indistinguishable form the metal in which the joint is made. Such an ideal situation is unachievable but welds giving

satisfactory service can be made in several ways. The choice of a particular welding process will depend on the following factors.

1. Type of metal and its metallurgical characteristics
2. Type of joint, its location and welding position
3. End use of the joint
4. Cost of production
5. Structural (mass) size
6. Desired performance
7. Experience and abilities of manpower
8. Joint accessibility
9. Joint design
10. Accuracy of assembling required
11. Welding equipment available
12. Work sequence
13. Welder skill

Frequently several processes can be used for any particular job. The process should be such that it is most, suitable in terms of technical requirements and cost. These two factors may not be compatible, thus forcing a compromise. Welding is one of the principle activities in modern fabrication, ship building and offshore industry. The performance of these industries regarding product quality, delivery schedule and productivity depends upon structural design, production planning, welding technology adopted and distortion control measures implemented during fabrication. The quality of welding depends on the following parameters: Skill of Welder, welding parameters, shielding medium and working environment, work layout, plate edge preparation, fit- up and alignment, protection from wild winds during-on-welding, dimensional accuracy, correct processes and procedures as well as suitable

distortion control procedures in place. The mentioned parameters are of utmost importance in welding and fabrication processes.

Welding and Fabrication is one of the trade courses offered in the Technical colleges in Nigeria, the trade course prepares the products for craftsmanship training as welder and fabricator. Welders are required to make, join and repair the metal parts for a massive range of machinery, equipment and structures while Fabricators are involved in the creation and repair of either light (water tanks, ducting, metal chains) or heavy metals (i.e. building structures, ships' hulls, bridges). As a fabricator you are likely to specialise in either light metal fabrication - including ducts, water tanks, metal chairs, and aircraft parts or in heavy metal fabrication - including building structures, ships hulls, and bridges. As a welder you are likely to find employment in one of the following types of organisations: Architectural, Agricultural, Marine, Transport, Structural, Heavy automotive or General engineering. Students in the welding and fabrication trade course (welding and structural steel) will gain the fundamental skills required to gain employment as a welder. These include skills in: Interpreting drawings, making calculations, Industry safety, Thermal cutting, Arc welding and MIG welding

According to Banta (2013), the qualities and characteristics that employers look for in prospective employees can be categorized as follows: knowledge, skills, and attitudes or traits. Areas within knowledge include technical skills as they relate to the job, basic adult literacy, and application of one's knowledge. Components within the skills area include communication, ability to work with people, organization and management skills, research, and computing skills. Research examining how survey data from employers are collected indicates that institutions use either a "broadside" method in surveying, for example sending surveys to employers without identifying specific individuals, or by gathering

information about specific graduates. For the last survey method, it is critical that permission is sought from the former student prior to surveying the employer.

Types of Welding

• Fusion Welding – melting base metals

– Arc Welding (AW) – heating with electric arc

– Resistance welding (RW) -heating with resistance to an electrical current

– Oxyfuel Welding (OFW) -heating with a mixture of oxygen and acetylene (oxyfuel gas)

– Other fusion welding -electron beam welding and laser beam welding

• Solid State Welding no melting, no fillers

– Diffusion welding (DFW) – solid-state fusion at an elevated temperature

– Friction welding (FRW) – heating by friction

– Ultrasonic welding (USW) – moderate pressure with ultrasonic oscillating motion

Oxy-acetylene Welding (Gas Welding)

Another type of welding is oxy-acetylene welding. Also known as oxy-fuel welding, oxy-acetylene welding is a process that relies on the combustion of oxygen and a fuel gas, typically acetylene. This type of welding referred to as gas welding. Oxy-Acetylene welding involves joining two metals with the help of a flame produced by the combustion of oxygen and acetylene. The gases are transported from the gas cylinders to the welding or cutting torch through hoses, and the flame is emitted through the nozzle at the end of the torch. The temperature of the flame is hot enough to melt the edges of the metal, and hence, fuse two metal pieces together. Gas welding is used almost exclusively for welding thin metal sections (Juan, 2018).

Oxy-acetylene welding is a flexible and forgivable welding process, making it a great choice for amateur and part-time welders. Oxy-acetylene welding equipment is also portable and easy to use. Juan (2018) provides insight into the oxy-acetylene welding process and the equipment used to get the job done. Oxy acetylene welding uses a high-heat, high-temperature flame that is produced by burning a fuel gas (most commonly acetylene) mixed with pure oxygen. The base material is melted with the filler rod using a flame from the combination of oxy fuel gas through the tip of the welding torch (commonly called oxy acetylene torch welding). The fuel gas and oxygen gas are stored in pressurized steel cylinders. Regulators in the cylinder reduce gas pressure. Gas flows through flexible hoses, with the welder controlling the flow via the torch. The filler rod is then melted with the base material. However, melting two pieces of metals is also possible without the need of the filler rod.

Oxy-Acetylene Welding Equipment

Oxy-fuel welding basic equipment includes the following:

Cylinders: Steel pressurized cylinders contain oxygen and the fuel gas.

Regulators: The flow of gas needs to be controlled. Regulators take high pressure and reduce it to a lower working pressure.

Hoses: A nonporous hose is used to move the oxygen and fuel gas to the torch. To prevent the wrong hose from being installed or set up incorrectly, the oxygen hose is usually green and the fuel gas hose is usually red.

Hose fittings: Siamese hoses are one piece with hoses that have been molded together. Hoses can also be taped together. Oxygen hoses have right-hand threaded fittings. Fuel-gas hoses have left-hand threaded fittings. Hose connections shouldn't leak after they're tightened. Regulator-mounted and torch-mounted flash arrestors should be used on oxygen hoses and

fuel hoses. Regulator-mounted flash arrestors stop flashbacks and backfires from entering the hoses and, potentially, the cylinders.

Safety valves: Safety valves keep the flow of gas going in one direction, preventing gas from flowing back into the wrong line or cylinder. They also reduce the possibility of a flashback.

Torches: Torches may vary in design, but all are made to provide complete control of the flame.

Welding Operation

• 50 types processes (American Welding Society) AWS (2018)

• Applications: Constructions, Piping, pressure vessels, boilers and storage tanks, Shipbuilding, Aerospace, Automobile and Railroad

• Welder - manually controls placement of welding gun

• Fitter assists by arranging the parts prior to welding

• Welding is inherently dangerous to human workers

– High temperatures of molten metals,

– Fire hazard fuels in gas welding,

– Electrical shock in electric welding

– Ultraviolet radiation emitted in arc welding (a special helmet with a dark viewing window) and

– Sparks, spatters of molten metal, smoke, and fumes (good ventilation).

• Automation - Machine, Automatic and Robotic welding

The Weld Joint

• Types of Joints

– Butt joint

– Corner joint

– Lap joint

– Tee joint

– Edge joint

Types of Welds

– Fillet weld

– Groove weld

– Plug and slot welds

– Spot and Seam welds

– Flange and Surfacing welds

Physics of Welding

• Coalescing Mechanism: Fusion via high-density energy

• Process plan to determine the rate at which welding can be performed, the size of the region and power density for fusion welding

• Powder density (PD): where P = power entering the surface, W (Btu/sec); and

A = the surface area, mm2 (in2)

– With too low power density, no melting due to the heat conducted into work

– With too high power density, metal vaporizes in affected regions

– Must find a practical range of values for heat density.

• In reality, pre & post-heating and non uniform

• For metallurgical reason, less energy and high heat density are desired.

2.3 Review of Related Empirical Studies

Radhakrishna and Bruening (2014) conducted a study on skills and experiences deemed necessary for agribusiness graduates in Pennsylvania. The authors focused on agribusiness employees and university agribusiness students who attended a workshop. Their findings revealed that students and employees of agribusiness agreed that the skills listed were more important than their ability to perform those skills. However, the groups differed in their perception of real-world skills and experiences needed to be successful. While students perceived internships to be vital to the success of their future employment, employees disagreed. Interestingly, students rated all skills (interpersonal, communication, technical, computer, and business and economic) as being more important than did employees. In addition, students felt more assured of their ability to perform interpersonal and communication skills than did employer.

Andelt *et al.* (2017) conducted a study to identify the competencies employers seek in college of agriculture graduates from the University of Nebraska-Lincoln and to determine whether or not graduates could perform the skills and competencies needed for career success. To accomplish this task, the authors sampled 769 employers who were college of agriculture alumni. All graduates were asked to provide contact information about their immediate supervisor, which consisted of: name, title of position, and permission to use the supervisor's name. Conclusions from the study revealed that employers suggested that communication skills would become increasingly more important over time. In addition, the ability to listen

and speak clearly was determined to be two of the most important aspects of communication skills. Employers felt as though leadership skills, such as problem solving and teamwork, would need to continue to improve in the future of the graduate employees. A recommendation from the study was for colleges to survey employers every three to five years in an effort to determine skills needed for college graduates as they begin their careers.

Graham (2017) conducted a three-year study to determine the preparation of entry-level agriculture graduates for employment as perceived by employers. The findings of this study implied that employers placed a strong emphasis on the skill areas of teamwork, leadership, dedication, and initiation. In terms of communication skills, employers rated listening as the most important. Character traits such as honesty, dependability, and integrity were also valued by the employers in this study.

Litzenberg and Schneider (2015) sought to determine the competencies needed in the agriculture workforce by agricultural economics graduates. The findings of this study showed that interpersonal skills were of the utmost importance to employers, followed by communications skills. Specifically, the top five most important individual items comprising interpersonal skills were: self-motivation and positive work attitude (1st), high moral/ethical standards (2nd), work with others/team player (3rd), work without supervision (4th). The nine items comprising communication skills, in order of importance, consisted of: listen and carry out instructions (1st), give clear and concise instructions (2nd), express creative ideas (3rd), professional telephone skills (4th), express creative ideas in writing (5th), speak clearly & concisely/technical info. (6th), write technical reports (7th), listen and summarize oral presentations (8th), and read specific technical information (9th). In addition, when considering previous work experience, "extracurricular activities" ranked first in terms of being most important.

Obi (2019) conducted a study "communication skills needed by university graduates employees for successful job performance in business organizations" and found that employees differed on their rating of the importance of writing, speaking, reading, and listening skills required by university graduates employees for successful job performance, but not significantly. The study concluded that university graduates employees were perceived deficient in all the four clusters of communication skills. The study recommended among others that the universities should be better equipped to teach communication skills as a separate course to produce better quality employees for the ever-changing business world. The skills according to her can also be taught under General Studies Use of English course.

Robinson (2016) in his research study sought to find out the graduates' and employers' perceptions of entry-level employability skills needed by agriculture, food and natural resources graduates. The study was carried out at the University of Missouri-Columbia comprising the population of 365 respondents (290 graduates and 75 employers). 67 skills identified by the researcher were deemed important at the workplace but with discrepancy in the priority in the importance of the skills. While the graduates perceived problem-solving skills followed by motivation as the most important, the employers perceived working with others and time management as most important skills needed.

CHAPTER THREE

3.0 RESEARCH METHODOLOGY

This chapter describes the procedure used in this study under the following sub-heading: Design of the Study, Population of the Study, Sample and Sampling Techniques, Instrument for Data Collection, Validation of the Instrument, Reliability of the Instrument, Method of Data Collection and Method of Data Analysis.

3.1 Research Design

A descriptive survey research design was used for the study. Survey research design enables one to obtain information from people who are considered to be representative of the entire population (Nworgu, 2006). In the same vein Gall *et al.* (2013) also stated that survey research method uses questionnaire or interview to collect data from a sample that has been selected to represent a population to which the finding of the data analysis can be generalized. The design were considered suitable since this study solicited information from practical skill acquisition enhancement needs of metalwork technology education students for improved job performance in welding in Minna metropolis.

3.2 Population of the Study

The population of the study consists of two groups, group one comprised of 20 metalwork technology teachers in Technical colleges and 20 Metalwork craftmen. The metalwork craftsmen in registered companies with corporate affairs commission CAC. There was no sampling technique due to the population is of manageable size.

3.3 Sample and Sampling Technique

There was no sampling technique due to the manageable size of the population.

3.4 Instrument for Data Collection

The instrument for data collection was a structured questionnaire. The questionnaire contained items organized into three sections A and B. Section A contains items designed to obtain personal information of the respondents. The items have options and blank spaces to enable the respondents tick as appropriate. Section "B" contain research questions, research question one contains twenty five items which deal with the electric arc welding skills needed by the metalwork technology education students for sustainable employment, research question two contains thirteen items which deal with oxy-acetylene welding skills metalwork technology education students are deficient for sustainable employment and research question three contains eighteen items which deals with the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment.

The questionnaire items were formulated based on a four point Likert scale. The response categories for sections B are Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). These response categories are assigned numerical values of 4, 3, 2, and 1 respectively. The respondents were required to check (√) against the response category that best satisfy their opinion.

3.5 Validation of the Instrument

The instrument was subjected to face and content validation by two experts from the Department of Industrial and Technology Education . Validation according to Uzoagulu (1998) is carried out to ascertain the appropriateness of the questionnaire items while Ary, Jacob and Razavieh (2002) explained that validity ensures that the questionnaire is appealing to the eye and that it appears valid for its intended purpose. Each validation will be serve with a copy of the questionnaire and requested to identify ambiguities and proffer suggestions for

improving the instrument towards meeting the objectives of the study. The experts' suggestions will be taken into consideration in the final draft of the questionnaire.

3.6 Reliability of the Instrument

In establish the reliability of the instrument, the instrument were trial tested on 5 metalwork teachers and 5 metalwork craftmen which was not part of the respondents used for this study. Reliability according to Ary, Jacob and Razavieh (2002) indicates the extent to which data are free from errors but capitulate consistent results. Cronbach Alpha formula will be used to determine the internal consistency of the instrument.

3.7 Method of Data Collection

The researcher personally administer copies of the questionnaire to the respondents with the help of two research assistants. The research assistants will be trained by the researcher on how to administer the instrument so as to ensure appropriate administration, safe handling and high return rate of the instrument. Each of the research assistants will be assigned to each technical college while the researcher will covered the last one and the industries.

3.8 Method of Data Analysis

The data generated from the use of the questionnaire was analyzed with the use of Statistical Package for Social Sciences (SPSS). Mean and standard deviation will used to answer each of the three research questions. The lower limit of agree is 2.50 any item with the Mean of 2.5 and above will be considered as required. However, each of the three hypotheses will be tested using t-test statistic at significant level of 0.05.

CHAPTER FOUR

4.0 RESULTS AND DISCUSSION

4.1 Research Question One

What are the electric arc welding skills needed by the metalwork technology education students for sustainable employment?

Table 4.1: Mean responses of the respondent on electric arc welding skills needed by the metalwork technology education students for sustainable employment.

$N_1 = 20$, $N_2 = 20$

S/N	ITEMS	$\bar{X}_A$	SD	Remarks
1	Ability to Identify Symbols and their application	2.62	0.59	Agreed
2	Skill in metal are joining	3.13	0.39	Agreed
3	Ability to maintain workshop safety	2.82	0.55	Agreed
4	Skill in Gas joining	2.63	0.49	Agreed
5	Ability to Identify types of metal	2.50	0.54	Agreed
6	Ability to know the properties of metals	2.65	0.48	Agreed
7	Ability to use measuring instrument	2.56	0.53	Agreed
8	Ability to use drills and drilling machine	3.26	0.59	Agreed
9	Ability to operate lathe machine	2.89	0.49	Agreed
10	Ability to cut and fill metal into sizes or dimensions	2.79	0.54	Agreed
11	Ability to read blue print	2.75	0.74	Agreed
12	Ability to understand basic electricity	3.14	0.40	Agreed
13	Skill in computer operation	2.82	0.50	Agreed
14	Ability to interpret working drawing, assembling drawing and details drawing	2.92	0.32	Agreed
15	Ability to construct agro-allied equipment	2.74	0.51	Agreed
16	Ability to understand behaviour of metal	2.60	0.49	Agreed
17	Ability to use jig and fixtures	2.64	0.45	Agreed
18	Ability to control effect of expansion	3.08	0.48	Agreed
19	Ability to construct burglary proof	2.08	0.34	Agreed

20	Ability to carry out simple equipment maintenance	2.77	0.76	Agreed
21	Ability to align cutting	3.00	0.74	Agreed
22	Ability to identify material needed for work	2.54	0.40	Agreed
23	Ability to arrange party in proper places before joining	2.73	0.50	Agreed
24	Ability to provide template	2.53	0.32	Agreed
25	Ability to keep periodic maintenance of equipment in good repair.	2.68	0.52	Agreed

Key

N_1 = Number of Metalwork Technology teachers
SD = Standard deviation
N_2 = Number of metalwork craftmen
$\bar{X}_A$ = Mean Average Metalwork Technology teachers and metalwork craftmen

The result presented in Table 4.1 above revealed that all the items agreed with the mean average on the electric arc welding skills needed by the metalwork technology education students for sustainable employment

4.2 Research Question Two

What are the electric arc welding skills metalwork technology education students are deficient for sustainable employment?

Table 4.2: Mean responses of the respondent on the electric arc welding skills metalwork technology education students are deficient for sustainable employment.

$N_1 = 20$, $N_2 = 20$

S/N	ITEMS	$\bar{X}_A$	SD	Remarks
1	Ability to Identify Symbols and their application	3.33	0.65	Agreed
2	Skill in metal are joining	2.92	0.67	Agreed
3	Ability to maintain workshop safety	2.67	0.89	Agreed
4	Skill in Gas joining	2.83	0.72	Agreed
5	Ability to Identify types of metal	2.83	0.72	Agreed
6	Ability to know the properties of metals	2.92	0.67	Agreed
7	Ability to use measuring instrument	2.92	0.67	5Agreed
8	Ability to use drills and drilling machine	2.50	0.67	Agreed

9	Ability to operate lathe machine	2.67	0.89	Agreed
10	Ability to cut and fill metal into sizes or dimensions	2.83	0.94	Agreed
11	Ability to read blue print	3.00	0.90	Agreed
12	Ability to understand basic electricity	2.54	0.75	Agreed
13	Skill in computer operation	2.53	0.79	Agreed
14	Ability to interpret working drawing, assembling drawing and details drawing	2.53	0.74	Agreed
15	Ability to construct agro-allied equipment	2.68	0.95	Agreed
16	Ability to understand behaviour of metal	2.54	0.69	Agreed
17	Ability to use jig and fixtures	2.96	0.79	Agreed
18	Ability to control effect of expansion	2.52	0.72	Agreed
19	Ability to construct burglary proof	2.56	0.56	Agreed
20	Ability to carry out simple equipment maintenance	3.21	0.83	Agreed
21	Ability to align cutting	3.17	0.90	Agreed
22	Ability to identify material needed for work	2.73	0.75	Agreed
23	Ability to arrange party in proper places before joining	2.60	0.79	Agreed
24	Ability to provide template	2.73	0.74	Agreed
25	Ability to keep periodic maintenance of equipment in good repair.	2.76	0.95	Agreed
26	Ability to control distortion	2.73	0.43	Agreed
27	Ability to perform soldering and brazing	2.94	0.34	Agreed
28	Ability to use marking out tools	2.56	0.21	Agreed

Key

N_1 = Number of Metalwork Technology teachers

SD = Standard deviation

N_2 = Number of metalwork craftmen

$\overline{X}_A$ = Mean Average Metalwork Technology teachers and metalwork craftmen

The result presented in table 4.2 revealed that all the respondent agreed with the mean average from 2.50-3.33 on the electric arc welding skills metalwork technology education students are deficient for sustainable employment. The result indicated that the electric arc welding skills metalwork technology education students are deficient for sustainable employment.

4.3 Research Question three

What are the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment?

Table 4.3

Mean responses of respondents on the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment.

$N_1 = 20$, $N_2 = 20$

S/N	ITEMS	$\bar{X}_A$	SD	Remarks
1	Not enough practical work provided	2.99	0.65	Agreed
2	Unqualified technical instructor	2.87	0.67	Agreed
3	Inadequate hand tools in the workshop	3.09	0.89	Agreed
4	Lack of spacious workshop	2.78	0.72	Agreed
5	Lack of machine tools	2.97	0.72	Agreed
6	lack of practical equipment	2.64	0.67	Agreed
7	Lack of conducive workshop environment	3.06	0.67	Agreed
8	Use of inappropriate teaching methods	2.67	0.67	Agreed
9	Lack of instructional teaching aid materials	3.04	0.89	Agreed
10	Low image of technical and vocational education	2.76	0.94	Agreed
11	Lack of electricity or power	3.14	0.90	Agreed
12	Lack of motivation for the instructor/students	2.78	0.75	Agreed
13	Poor funding by government	3.33	0.79	Agreed
14	Students show no interest in practical work	3.32	0.74	Agreed
15	Inability to up-date the school program	2.86	0.95	Agreed
16	Inability to provide a variety of training programmes	3.24	0.69	Agreed
17	Poor societal attitude to technical/vocational education	3.22	0.79	Agreed
18	Students provide materials for practical work	2.66	0.72	Agreed

Key

N_1 = Number of Metalwork Technology teachers
SD = Standard deviation
N_2 = Number of metalwork craftmen
$\bar{X}_A$ = Mean Average Metalwork Technology teachers and metalwork craftmen

Table 4.3 revealed that most of the respondents agreed with the mean average 2.66-3.22 on the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment. The result indicate that these are the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment.

HYPOTHESES TESTING

4.4 Hypothesis One

There is no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on electric arc welding skills needed by the metalwork technology education students for sustainable employment.

Table 4.4

t-test analysis on the mean rating of the respondents on the electric arc welding skills needed by the metalwork technology education students for sustainable employment.

S/N	Respondents	N	$\overline{x}$	SD	d.f	t-cal	t-critical
1	Metalwork Technology teachers	20	2.54	0.52	38	-0.68	1.98
2	metalwork craftmen	20	2.44	0.49			

Key

N_1 = Number of Metalwork Technology teachers
SD_1 = Standard deviation of Metalwork Technology teachers
N_2 = Number of metalwork craftmen
SD_2 = Standard deviation of metalwork craftmen
t = t-test value of metalwork craftmen and Metalwork Technology teachers
Df = degree of freedom
NS = Not significant

The analysis in Table 4.4 shows that the t-cal values of all the 25 items are needed. There was no significant difference between the mean responses of Metalwork Technology teachers and

metalwork craftmen on electric arc welding skills needed by the metalwork technology education students for sustainable employment. Therefore the null hypothesis was accepted.

4.5 Hypotheses Two

There is no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on oxy-acetylene welding skills metalwork technology education students are deficient for sustainable employment.

Table 4.5

t-test analysis on the mean rating of the respondents on oxy-acetylene welding skills metalwork technology education students are deficient for sustainable employment.

S/N	Respondent	N	$\overline{x}$	SD	d.f	t-cal	t-critical
1	Metalwork Technology teachers	20	2.84	0.75	38	-1.15	1.98
2	metalwork craftmen	20	2.65	0.77			

Key
N_1 = Number of Metalwork Technology teachers
SD_1 = Standard deviation of Metalwork Technology teachers
N_2 = Number of metalwork craftmen
SD_2 = Standard deviation of metalwork craftmen
t = t-test value of metalwork craftmen and Metalwork Technology teachers
Df = degree of freedom
NS = Not significant

The analysis in Table 4.5 shows that the t-cal values of all the 28 items are required. There was no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on oxy-acetylene welding skills metalwork technology education students are deficient for sustainable employment. Therefore the null hypothesis was accepted.

4.6 Hypothesis Three

There is no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment.

Table 4.6

T-test analysis of the respondents on the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment.

S/N	Respondent	N	$\overline{x}$	SD	d.f	t-cal	t-critical
1	Metalwork Technology teachers	20	3.04	0.42	38	0.31	1.98
2	metalwork craftmen	20	3.09	0.59			

Key
N_1 = Number of Metalwork Technology teachers
SD_1 = Standard deviation of Metalwork Technology teachers
N_2 = Number of metalwork craftmen
SD_2 = Standard deviation of metalwork craftmen
t = t-test value of metalwork craftmen and Metalwork Technology teachers
Df = degree of freedom
NS = Not significant

The analysis in table 4.6 shows that the t-cal values of all the 18 items agreed. There was no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment. Therefore the null hypothesis was accepted

4.7 Summary of Major Findings

1. The respondents agreed on the electric arc welding skills needed by the metalwork technology education students for sustainable employment.
2. The respondents agreed on the electric arc welding skills metalwork technology education students are deficient for sustainable employment
3. The respondents agreed on the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment
4. There was no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on electric arc welding skills needed by the metalwork technology education students for sustainable employment.
5. There was no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on oxy-acetylene welding skills metalwork technology education students are deficient for sustainable employment
6. There was no significant difference between the mean responses of Metalwork Technology teachers and metalwork craftmen on factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment.

4.8 Discussion of Result

The findings on research question one revealed that the electric arc welding skills are needed by the metalwork technology education students for sustainable employment. The findings of the study corroborate with Yusuf, (2015) who observed that the beneficiaries of metalwork technology education pass through institutions without mastering the skills that will scale them through the labour market successfully. With the low level of skill acquisition there is great fear of failure that prevents an individual from venturing into

unfamiliar grounds. The findings of the study is also supported by Radhakrishna and Bruening (2014) conducted a study on skills and experiences deemed necessary for agribusiness graduates in Pennsylvania. The authors focused on agribusiness employees and university agribusiness students who attended a workshop. Their findings revealed that students and employees of agribusiness agreed that the skills listed were more important than their ability to perform those skills. However, the groups differed in their perception of real-world skills and experiences needed to be successful. While students perceived internships to be vital to the success of their future employment, employees disagreed. Interestingly, students rated all skills (interpersonal, communication, technical, computer, and business and economic) as being more important than did employees.

The findings on research question two revealed that electric arc welding skills metalwork technology education students are deficient for sustainable employment. The findings is also inline with Ezewu, (2014) also observed that the practical training given to metalwork technology students may not be sufficient for them to become self reliant, he claimed that what we are practicing now is for examination purpose to attain a certificate of education. Consequently, many that have graduated can not defend their certificate, hence, there are many employees that can not face the challenges of the task, they were engaged to handle. A metalwork technology graduate can only become self employed if he is practically balanced with good entrepreneurial initiatives. The labour market has become saturated and metalwork technology graduates float the streets without government paid jobs majority of these graduates are without sufficient practical skills and entrepreneurial initiatives to make them established a workshop of their own. They carry faces that clearly spelt out frustration, dejection and hopelessness. It was also supported by Andelt *et al.* (2017) conducted a study to identify the competencies employers seek in college of agriculture graduates from the University of Nebraska-Lincoln and to determine whether

or not graduates could perform the skills and competencies needed for career success. All graduates were asked to provide contact information about their immediate supervisor, which consisted of: name, title of position, and permission to use the supervisor's name.

The findings on research question three revealed that there are factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment. The findings of the study concur with Robinson (2016) in his research study sought to find out the graduates' and employers' perceptions of entry-level employability skills needed by agriculture, food and natural resources graduates. The findings revealed that). 67 skills identified by the researcher were deemed important at the workplace but with discrepancy in the priority in the importance of the skills. While the graduates perceived problem-solving skills followed by motivation as the most important, the employers perceived working with others and time management as most important skills needed.

CHAPTER FIVE

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The study determine practical skill acquisition enhancement needs of metalwork technology education students for improved job performance in welding in Minna Metropolis. The objectives of the study are to determine electric arc welding skills needed by the metalwork technology education students for sustainable employment, oxy-acetylene welding skills metalwork technology education students are deficient that negate sustainable employment and factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment. The study conclude that electric arc welding skills needed by the metalwork technology education students for sustainable employment.

5.2 Implication of the Study

The study implies that metalwork technology graduate require the necessary skills they are deficient in electrical arc welding for sustainable employment in metalwork industry.

5.3 Contribution to Knowledge

The study contribute to knowledge by establishes evidences on the electrical welding skills needed by the metalwork technology education students for sustainable employment. It was also established that oxy-acetylene welding skills metalwork technology education students are deficient for sustainable employment.

5.4 Conclusion

The study determine practical skill acquisition enhancement needs of metalwork technology education students for improved job performance in welding in Minna Metropolis. Three objectives were formulated for the study, three research questions were raised to guide the study and three hypothesis were formulated at 0.05 level of significance. The findings of the

study revealed that the respondents agreed on the electric arc welding skills needed by the metalwork technology education students for sustainable employment. It also revealed that the respondents agreed on the electric arc welding skills metalwork technology education students are deficient for sustainable employment. The study also shows that the respondents agreed on the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment.

5.5 Recommendations

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

1. The administrators should know how to manage and tackle the challenges facing Welding and Fabrication.
2. Technicians who want to enrich themselves with skills in metalwork should learn how to manage all kinds of tools and equipment in welding and fabrication.
3. The Government should provide the necessary infrastructure, equipment and training materials that are basic requirement for teaching and learning of welding and fabrications.
4. Teachers should help enlighten students on the ways of improving on their skills in welding and fabrication.

5.6 Suggestion for Further Studies

1. Metalwork technology and manpower development for technical colleges in North Central
2. Assessing the effectiveness of technical education curriculum in teaching welding and fabrication in Niger State

REFERENCES

Abdulhamid I. (2005) Assessing the effectiveness of technical education curriculum in teaching NCE technical courses. Nigeria journal of education services F.C.E. (Kano) Vol. 1 No. 6 June. 2005.

Adetokunbo, K (2009). Bridging the Skills Gap in Nigeria. A Keynote Address At the 24th Conference of Association of Vice Chancellors of Nigeria University, Ilorin, Nigeria.

Akale, M. A. G. (2004): Educational policies and strategies for achieving reforms in Nigeria. A paper presented at workshop on capacity building for lecturers in college of education, organized by educational tax fund, (ETF) in collaboration with the national commission for colleges of education (NCCE) Held at FCE, Katsina.

Akpan A.C. (2003). The quality of training of received in electricity and electronics programme by Technical College Graduates in Akwa Ibom State. Unpublished M. Ed. Thesis, Department of Vocational Teacher Education, University of Nigeria Nsukka.

Alio, A.N. (2008). Fundamentals of Educational Research. Enugu: Samireen Nigeria Ltd. Amusa, T.A. (2009). Competency improvement needs of farmer in cocoyam production in Ekiti State, Nigeria unpublished PGDTE Thesis, Faculty of Education, University of Nigeria Nsukka.

Allison, H. T. (1982): The training of primary school science teacher. (STAN) 23rd anniversary conference proceedings.

Aluwong, E. B. (2004) Metalwork technology and manpower development. A multidisciplinary. *Journal of national association for the advancement of knowledge* (NAFAK), Vol. 9, No. 4 Pp. 93– 97.

Anaele, E.O. (2002). Building Construction skills needed by technical college students for self- employment: *Journal of Technology and Research*. 1(1), 23-33.

Ezewu, E. E. (1992): Teachers education in the year 2000, in B. G. Nworgu (ed). Prospective on teacher education in Nigeria, Nsukka University Trust. Pp. 1 – 13.

Federal Republic of Nigeria (2013). National Policy on Education. Abuja: Federal Government.

Federal Republic of Nigeria, (2004): National policy on education Lagos: NERDC

Golden, M. (2000). Updating Educational Assessments to measure "21 Century Skills" www.microsoftontheissues.com

Hornsby, A. S. (2001): Oxford Advanced Learners Dictionary (6th Edition) London: University Press.

Makama, G. B. (2000): Technical method unpublished booklet, Kaduna State College of Education, Kafanchan.

Nwaokolo, P. O. (2002): Technology teacher education in the 21st Century Nigeria: Perspective of personnel and facilities requirement for national development. Journal of technical teachers education, Vol. 3 No. 1.

Oga, E. G. (2003): The challenges in the realization of qualitative education in Nigeria in the 21st Century; in Agocha, A. (eds). Aspect of Nigeria education; A book of reading in education, Makurdi: Braine books publication.

Okoro, O.M (2006). Principle and Method in Vocational Technical Education. Enugu: University Publisher.

Olagunju, (1994): Secretariat profession in the 21st century, Lagos NAPSON Annual National Workshop Journal Vol. 1 Pp. 42.

Olaitan, S. O. (1982): Theory and practice of vocational education in Africa unpublished Monograph.

Olaitan, S.O (1998). Vocational Education and National Manpower Development Constraints and Strategies. Unpublished Manuscript, University of Nigeria, Nsukka.

Oranu, R.N, Nwoke. G.I & Ogwo, B.A (2002). Fundamentals of metalwork practice. Enugu: Donze press.

Udo, M. P. (2005): Towards practical skills acquisition in vocational education in Nigeria tertiary institution: A strategy for realizing its vision and mission in the 21st century. A paper presented at the 7th annual national conference, organized by the national association for advancement of knowledge (NAFAK). Held at F.C.T. College of Education Zuba – Abuja between 7 – 11 March, 2005.

Uzoagulu, A.E (2002). Techniques for increasing productivity among technical workers: *Journal of research in Science and Technology Education*, 1 (3), 46-53.

Yusuf, A. O. (2001): Appropriation of technology education for self – employment panacea for poverty eradication in Nigeria.

APPENDIX A

REQUEST FOR VALIDATION OF RESEARCH INSTRUMENT

Dear Sir,

I am a student of Federal University of Technology, Minna in the Department of Industrial and Technology Education. I am currently carrying out a study titled: **Practical Skill Acquisition Enhancement Needs of Metalwork Technology Education Students for Improved Job Performance in Welding in Minna Metropolis.**

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

Thanks.

Validated by:

Name: _____

Sign: _____

Date: _____

QUESTIONNAIRE ON PRACTICAL SKILL ACQUISITION ENHANCEMENT NEEDS OF METALWORK TECHNOLOGY EDUCATION STUDENTS FOR IMPROVED JOB PERFORMANCE IN WELDING IN MINNA METROPOLIS

Dear respondent,

This Questionnaire is designed to obtain information on **Practical Skill Acquisition Enhancement Needs of Metalwork Technology Education Students for Improved Job Performance in Welding in Minna Metropolis**. Please, kindly assist by filling the necessary information where appropriate. Any information obtained will be held in strict confidence and will be used solely for the purpose of this academic study. Please tick or write in the appropriate location.

SECTION A

Metalwork Technology Teachers [ ]

Master Welders [ ]

SA= Strongly Agree (4 points)
A= Agree (3 points)
DA= Disagree (2 points)
SD= Strongly Disagree (1 point).

SECTION B

RESEARCH QUESTION ONE

1. What are the electric arc welding skills needed by the metalwork technology education students for sustainable employment?

S/N	ITEMS	SA	A	D	SD
1	Ability to Identify arc welding Symbols and their application				
2	Skill in metal arc joining				
3	Ability to maintain steady hands and good eye coordination when during welding				
4	Skill in open electric arc or flame				
5	Ability to open circuit voltage of an electric arc welding				
6	Ability to maintain low welding voltage				
7	Ability to maintain higher welding voltage				

8	Ability to fix electrode to the touch				
9	Ability to install welding equipment				
10	Ability to maintain electric arc cutting				
11	Ability to perform intermediate welding				
12	Ability to identify correct welding pattern				
13	Ability to align cutting				
14	Ability to identify material needed for work				
15	Ability to arrange party in proper places before joining				
16	Ability to provide template				
17	Ability to keep periodic maintenance of equipment in good repair.				

Research Question Two

What are the oxy-acetylene welding skills metalwork technology education students are deficient that negate sustainable employment?

S/N	ITEMS	SA	A	D	SD
1	Skills in adjusting regulator pressure as required				
2	Skills in lighting the welding touch				
3	Skills in Adjusting regulator screws to tip pressure settings				
4	Skills in maintaining a particular flame for welding				
5	Skills to depress cutting lever and adjust pressure				
6	Skills in Separate oxygen and fuel gas lines				
7	Skills in igniting spark lighter				
8	Skills in turning off the touch				
9	Skills in identifying tips sizes				
10	Skills in open oxygen valve and adjust to neutral flame				
11	Skills in fitting of hose				
12	Skills in maintaining regulator-mounted flash arrestor				
13	Skills in maintaining oxy-acetylene cylinders				

RESEARCH QUESTION THREE

What are the factors that militate against the acquisition of electric arc welding skills needed by metalwork technology education students for sustainable employment?

S/N	ITEMS	SA	A	D	SD
1	Not enough practical work provided				
2	Unqualified metal technologist instructor				
3	Inadequate hand tools in the workshop				
4	Lack or not enough of space in the workshop				
5	Lack of electric arc welding tools				
6	lack of practical equipment				

7	Lack of conducive workshop environment				
8	Use of inappropriate teaching methods				
9	Lack of instructional teaching aid materials				
10	Lack of proper setup or procedures				
11	Lack of electricity or power				
12	Lack or not enough motivation from the instructor				
13	Lack or not enough of fund				
14	Poor interest of student in practical work				
15	Lack of up to date technologies in electric arc welding program				
16	Inability to provide a variety of training programs				
17	Poor attention to technical/vocational education				
18	Not enough material provide for welding practical work				