

**STRATEGIES FOR REDUCING WASTAGE AMONG SELF EMPLOYED METAL  
WORK GRADUATES OF TECHNICAL COLLEGES IN NIGER STATE**

**BY**

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**2016/1/63746TI**

**DEPARTMENT OF INDUSTRIAL TECHNOLOGY EDUCATION**

**SCHOOL OF SCIENCE EDUCATION**

**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA**

**APRIL, 2023**

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

**APRIL, 2023**

## **DECLARATION**

I, ABDULLAHI IBRAHIM with Matriculation Number 2016/1/63746TI an undergraduate student of the Department of Industrial and Technology Education certify that the work embodied in this project is original and has not been submitted in part or in full for any other diploma or degree of this or any other university.

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**ABDULLAHI IBRAHIM**  
**2016/1/63746TI**

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**Signature & Date**

## **CERTIFICATION**

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

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**DR C.O.IGWE**  
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**Head of Department**

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**Date**

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**External Examiner**

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**Date**

## **DEDICATION**

I dedicate this project to my parent Mr. and Mrs. Ibrahim Hassan, for their financial support during my study. Also to my family and friends for their advice towards my education.

## ACKNOWLEDGEMENTS

A project work of this kind, cannot be successfully carried out without the effort and support of others. To this end, I am indebted to the following through whom this work was a success.

First and foremost, I acknowledge the grace and mercy of God that sustained me throughout the programme.

To my dear parents, I am indebted, for their moral and financial support that made this work a success. My special appreciation goes to my able project supervisor, Dr. C.O Igwe for his guidance towards the realization of this project. My sincerely gratitude goes to my Head of Department, Dr. T. M. Saba. Also I wish to extend my appreciation to my colleagues and friends who supported me at one point or the other towards the success of my study. The entire scholars whose works have been referred to in writing this text have been acknowledged in the bibliography.

I am grateful to them for their intellectual contribution to the subject matter for the benefit of humanity. Lastly, my deep appreciation goes to my friend martins and kabala who stood by me through the stormy weather, may the good lord see both of you through in all your endeavors in life.

## **ABSTRACT**

The study was carried out to determine strategies for reducing wastage among self employed metalwork graduates of technical colleges in Niger State. Survey research design was adopted for the study. The population for the study was 50 comprises of 20 technical teachers in technical colleges and 30 self employed metalwork graduates. A structured questionnaire was used as instrument for data collection. four research questions and two null hypotheses were formulated. Mean was used to analyze the data for answering research questions while analysis of variance was used to test the hypotheses of no significant difference at 0.05 level of significance. The study found out that twelve factors were found to be causes of wastage among self employed metalwork graduates of technical colleges, twelve training activities were found for retraining self employed metalwork graduates to reduce wastage, workshops/working environment should be organized in ten ways by self employed metalwork graduates to reduce wastage and seven working procedures were found to be adopted by self employed metalwork graduates to reduce wastage. It was recommended that seminars or workshops or retraining programme on how to reduce wastage should be organized for self employed metalwork graduates already in the field and technical teachers. Curriculum of vocational and technical education programmes in technical colleges should be also reviewed to meet up with modern needs/technologies in the society.

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## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the Study

Education have long been recognized as the instrument for national development (FGN, 2004); while vocational and technical education (TVE) in particular, is viewed as the cornerstone for any sustainable technological development (Aina, 2006). Federal Government of Nigeria (2004) described education as an instrument per excellence for effecting national development. Technical and vocational education is used as a comprehensive term in the educational process involving, in addition to general education, the study of technologies and related sciences and acquisition of practical skills, attitudes, understanding and knowledge relating to occupations in various sectors of economic and social life (FGN, 2004). Okoro (1993) quoted in Agapu and Andural (2007) and Momoh (2012) defines vocational education as a form of education whose primary purpose is to prepare persons for employment in recognized occupation. In the same vein he defines technical education as a post-secondary vocational training programme which the major purpose is the production of technicians. Experts agree that skill training provided by TVE enhances productivity and sustains competitiveness in the global economy (Edukugho, 2005). Individual either goes through liberal, general or vocational education. In their view Ogwo and Oranu (2006) opined that vocational education programme depend on general education to provide theoretical explanation on scientific principle and general information on the environment. Technical and vocational education is an integral part of general education (UNESCO and ILO, 2002 in Ogwo and Oranu, 2006).

The aim of establishing technical colleges is to produce graduates with saleable skills. To achieve this, it requires a laboratory setting as a unique learning situation in which the learner may

experiment, test, construct, disassemble, repair, design, create, imagine and study (Ezeji, 2004). Technical colleges according to Okorie (2001) are the institutions where craftsmen are trained to the craft level of National Business and Technical Examination leading to award of National Technical Certificate (NTC). Okoro (2006) described technical colleges as the principal vocational institutions designed to prepare students in various occupation areas for employment. If the stated educational objectives are not strictly followed and observed, then it becomes educational wastage. There are several patterns of educational wastage such as school dropout, unguided selection of vocational/technical courses and inadequate educational fund. Granveir (1986) had pointed out that there is need not only to increase the rate of economic growth by an appropriate investment in human capital, but also to replace costly expatriate manpower by skilled indigenous personnel. Technical and vocational education refers to those components of the general education curriculum which introduce students to the elements of technology in order to acquaint them with the role of technology in contemporary life and permit them to develop basic practical skills in the manipulation of simple tools and materials (Osuala, 1999). Encyclopedia Britannica (1994-2001) described technical education as the academic and vocational preparation of students for jobs involving applied science and modern technology. According to Uwaifo (2009), technical education is the training of technically oriented personnel who are to be the initiators, facilitators and implementers of technologically development of a nation. In his own opinion, this training of its citizens on the need to be technologically literate would eventually lead to self-reliance and sustainability. He observed that technical education more than any other profession has direct impact on the development of the country.

Hassan and Baba (2012) stated that there is mismatch between training and labour market skills demand which is a major source of wastage in TVET in Nigeria. Similarly Brunner and Paul in

Ajayi and Mbah (2008) added that wastage is the degree to which the actual output fails to correspond with stated goal of education within a given period of time.

In this study, wastage refers to the loss in utility of skill acquired by graduates of metal-work trade. Wastage according to Akpan (2001) hinders the achievement of educational goals of a nation. Nwimo (2004) said that wastage literally means something not occupied or used for any purpose. This implies that wastage is an error committed that militates against the output of self-employed metalwork graduates. Wastage has been observed among metalwork graduates. Self-employed metalwork graduates are the products of technical colleges who studied metalwork and work for themselves after graduation. These graduates sometimes damage their tools, equipment or machines, materials or even because more havoc to the work contracted to them. This may be due to little or no skills acquired while in training. In order to reduce these wastages among the self-employed metalwork graduates, strategies are required to be put in place.

Strategies are plans that are intended to achieve a particular purpose. Oziegbunam (2011) described strategies as important features that can be used to promote the effectiveness of a programme or an attempt to bring solution to any area of difficulties. Training activities is one of the strategies to be considered in reducing wastage among self-employed metalwork graduates. Training activities need to be organized for them in form of retraining programme.

Organization of workshop and working environment of self-employed graduates may also contribute to wastage if not properly planned and organized. Unplanned workshops and unarranged training equipment and tools may cause accidents during practical. This may also result to damages of worthy equipment and materials. Poor working methods and procedures can also lead to wastage of materials and other expensive tools and machines. Proper working methods and procedures could be adopted as strategies for reducing wastage among selfemployed

metalwork graduates in the workshop. Salami (1993) mentioned structure of the educational system, admission of students into the system, guidance of students admitted into the system as sources of wastage in vocational technical education. Similarly, Okorie (2001) emphasized that technical teachers need to improve their knowledge because technology is fast changing and there is need for the re-training and upgrading of technical teachers to enable them embrace the change. The technical teachers should also possess the ability of helping others to learn from wealth of vocational skills. A vocational teacher who has the job skills but is unable to help others acquire the skills is a source of wastage in vocational education. The annual report from Annual General Meeting of principals of all Federal Technical Colleges (1998) submitted that there is problem of inadequate qualified technical teachers in the country. It was further explained in the report that the picture of staffing depicted show total weakness in all trade areas. Inappropriate methods of assessing students' performance in practical are factors influence wastage in vocational education.

Azubuikwe (2006) said that wrong methods and approaches are always adopted by teachers in various technical colleges in measuring students' performance in practical assignments and project work in school workshops. Most gainful skills acquired by students of vocational programme is on practical assignment or project work, this require a close monitoring of students performance and assessment. Osuala (1991) observed that practical project has been found useful in examining technical and human skills and competencies acquired by trainees especially in Master-apprentice on-the-job training. Practical training of workers in any pursuit brings both immediate and lasting economic returns in increased production and wage-earning capacity (Okorie, 2001).

Technical teacher should be practical oriented so as to impart those practical skills to the learners. Ezeji in Sogeyinbo (2006) pointed out that teachers' role should be of facilitating learning through the use of materials and skills, and not merely transferring the knowledge. Lack of practical skills

among graduates of Technical Colleges in Nigeria is responsible for their low productivity. Skill can be defined as the established attitude to work. Ede (2001) described skill as a expertness or dexterity or practiced ability facilitating doing something. Okorie (2000) classified skills into human and technical. The author further described human skills as those involved in critical thinking, imagination and creative ideas that result in designing, while technical skills as those developed through application of principles of science and engineering.

The major factors causing low productivity and wastage among graduates of technical colleges is lacked of saleable skills. According to Anaele (1991), most graduates of Technical Colleges who studied various trades and could not go for further studies neither gain employment nor practice the profession on their own for lack of employable skills. Nwadiani (2000) calls them victims of unemployment as a result of what he called 'compulsory miseducation'. Similarly, Olaitan and Ede (2008) reported that many graduates of Technical Colleges and Polytechnics now resort to the use of commercial motorcycle (Okada) for their livelihood due to lack of employable skills from their institutions. Another wastage factors influencing low productivity in vocational technical education is the shortage of technical experts or operators to install and operate those equipment and machines that were imported and delivered to various Technical Colleges in Nigeria. Collin (2003) said that productivity is the quality of being productive or having the power to produce. Encarta (2008) explained influence as the effect of something on a person, thing, or event.

These equipment and machines are still found not activated. Fafunwa (1991) observed that a lot of equipment imported to accelerate technological education in this country has remained uncatered for. Mbata (1994) observed that some workshop equipment and tools are substandard, not to talk of being properly managed. Oranu (1991) said that the nature of the tools and equipment

used in training are not properly related to the world of work. This will result to low productivity of metalwork graduates.

Metalwork is among the trades offered in Technical Colleges in Niger State. Metal work is a trade that has casting, foundry, welding, fabrication, machinery and forging as its components. In each of the components, students learn relevant practical skills for employment after graduation. Oranu (2002) described metalwork as an occupation that entails designing, processing and fabrication of metal product. They further explained that in metalwork, activities such as foundry, forging, machine show and welding are always carried out. Metalwork technology is the art of manipulating or forming a piece of metal into the desired shape with accurate dimensions. Metalwork is purely a practical field that requires practical skills. Activities in Metalwork are always carried out in the workshop. Sulaiman (2000) said that well equipped workshop or laboratory be provided for learning situation in which a learner could experiment, study, imagine, create, design, construct, dismantle, repair and build equipment.

It is very important that the Technical Colleges equip their students with the needed skilled required to be self-reliant, therefore Metalwork trade in Technical Colleges was designed to produce competent craftsmen in Metalwork. For one to be self-employed in metalwork one needs to be well equipped with adequate metalwork skills that would enable one undertake that Metalwork activities encountered in the world of work. Metalwork skills are the type of skills required by graduates to carry out technical activities in metalwork technology. These skills are required in reaming, making soldering and brazing, using layout tools, arc welding, grinding machine cutting tools, and cutting operations on the lathe. According to Oranu (2002) there are several operations that can be carried out on the various machines such as drilling machine, shaping

and milling machine. Iwuoha (1989) observed that the knowledge of maintenance and repair of equipment is very essential in the manning of any machine shop.

Oputa (2008) pointed out that functional facilities enable schools and society to achieve their educational goals. Where these are not provided the result is the production and proliferation of unskilled manpower class on a sustained bases and accelerated rate of wastages of the technical know – how of instructors in vocational education programmes. He observed that wastage factors as experienced in technical institutions could be responsible for the low productivity of most technical college graduates engaged in self-employment. This study became necessary to identify strategies for reducing wastage among self-employed metalwork graduates of Technical Colleges in Niger State.

## **1.2 Statement of the Problem**

Technical colleges in Nigeria are established to expose individuals to skills in various trades or occupations such as Woodwork, Electronics, Electricity, Automobile Technology and Metalwork. The main emphasis for those specializing in Metalwork trade in particular should be the acquisition of the skills required for employment after graduation. Most of these graduates after spending three or more years in Technical Colleges acquired little or no skills for self employment or to work in the industries. Iwuoha (1989) explained that most of graduates who specialized in metalwork in technical colleges are good in the theoretical aspects but the performance level in the practical is very low. These graduates therefore found it difficult to set up their businesses. Those who succeeded in establishing their workshops found it very difficult to attract customers. They cause more havoc to the work contracted to them and this amounted to wastage. These may be as a result of lack of quality instruction received while in training. Hence the high rate of unemployment of technical college graduates persists. Olaitan (1996) remarked that in Nigeria

where there are abundant resources, many craftsmen are found in the streets or towns and cities without jobs because their training is irrelevant or inadequate to societal needs. Therefore, it is only a practical oriented skill training programme geared towards self-employment that could make graduates of Technical Colleges and other vocational institutions productive.

Okorie (2000), observed that there is high rate of low level skill development in Nigeria technical colleges. Consequently, the graduates of these colleges do not possess the needed saleable skills to qualify them for employment. However there are insufficient skills possessed by graduates of technical college which lead to the low output among self-employed graduates. The problem of this study is to identify strategies for reducing wastage among self-employed metalwork graduates of technical colleges in Niger State.

### **1.3 Purpose of the Study**

The purpose of this study was to determine the strategies for reducing wastage among self-employed metalwork graduates of technical colleges in Niger State. Specifically, the study determined:

1. Factors that lead to wastage among self-employed metalwork graduates of technical colleges.
2. Training activities to be organized for retraining self-employed metalwork graduates to reduce wastage.
3. how workshops/working environment should be organized by self employed metalwork graduates to reduce wastage.
4. Working procedures to be adopted by self-employed metalwork graduates to reduce wastage.

#### **1.4 Significance of the Study**

The findings of this study will be of great benefit to the teachers, students, curriculum planners, policy makers, technical colleges, and society at large. Technical teachers will benefit from the findings of the study as the already identified training activities and procedures in metalwork could be used to train their students in schools without preparing further notes. The identified metalwork activities and procedures to be adopted to reduce wastage and how workshop/working environment should be organized could be used to retrain metalwork teachers. The self-employed metalwork graduates will also benefit from the findings of this study as the identified entrepreneurial skills and working procedures in metalwork could be used to train them in order to reduce wastage. The self-employed metalwork graduates will be productive as they are trained with these identified entrepreneurial skills and procedures.

The findings of this study will be of great benefit to the curriculum planners as the already identified methods, procedures and entrepreneurial skill training could be integrated into the programme of metalwork of technical colleges. Also, the students of metalwork in technical colleges will benefit from the findings of the study as the integrated methods, procedures and entrepreneurial skills could be used to train them on how to reduce wastage.

The findings of this study will benefit the society at large. A crop of qualified metalwork graduates from technical colleges will be produced in order to solve societal problems. Members of the society will have qualified metalwork graduates to repair and even produce some domestic materials for use. Also industries will also benefit from the findings of this study if the identified metalwork skills are used to train students while in schools. These students will graduate with skills and be employed by the industry where they will be productive. Educational researchers will benefit from the study as this study will serve as a source of literature.

## **1.5 Scope of the Study**

The study was restricted to identification of strategies for reducing wastage among self-employed metalwork graduates of technical colleges in Niger State. The study will identify those factors leading to wastage among self-employed metalwork graduates of technical colleges. Among the strategies to be identified by this study include: training activities, how workshops/working environment should be organized and working procedures to be adopted by self-employed metalwork graduates to reduce wastage in their workshops.

## **1.6 Research Questions**

The following research questions guided the study:

1. What are the factors that contribute to waste among self-employed technical college graduates??
2. What are the training activities for retraining self-employed metalwork graduates to reduce wastage?
3. How should workshops/working environment be organized by self-employed metalwork graduates to reduce wastage?
4. What are the working procedures to be adopted by self-employed metalwork graduates to reduce wastage?

## **1.7 Hypotheses**

The following null hypotheses were tested at 0.05 level of significance.

**H01:** There is no significant difference between the mean responses of metalwork teachers, experienced and less experienced self-employed metal work graduates on the determinants of wastage among self-employed graduates to technical colleges.

**H02:** There is no significant difference between the mean response of metalwork teachers, experienced and less experienced self-employed metalwork graduates on the training activities to be organized for retraining self-employed metalwork graduates to reduce wastage?

## **CHAPTER TWO**

### **2.0 REVIEW OF RELATED LITERATURE**

#### **2.1 Concept of Wastage in Vocational Technical Education**

However, wastage in vocational technical education is the failure of the expected input to correspond with the output, thereby lose expected result. Akpan 2001) simply defined wastage in vocational education as the inefficient use of technical and educational resources.

According to Okoro (2000), planning as well as reducing waste in the educational process and production have received attention in the effort to make the educational system productive. In vocational education, waste has been divided into two categories: direct waste and indirect waste. Direct wastage happens when conditions including a lack of skilled technical teachers, retirement, and death result in the unnecessary loss of vocational education trainers. According to the FRN (2000), teachers will be expected to take a more active role in the creation or evaluation of educational materials and teaching aids as well as the assessment of technical innovative and new

procedures. The term "direct wastage" also refers to the waste of human resources that were supposed to help technical college students develop a variety of abilities. To prevent human wastage technical teachers are advised and required to improve on their knowledge so as to fit into the changing technological advancement of the time. Nwimo (2004) opined that technical teachers should possess the ability of helping others to learn from his wealth of vocational skills. He further explained that a vocational teacher who has the job skills but is unable to help others acquire the skill is a source of wastage in vocational education.

Indirect wastage is the result of losses in output and productivity of graduate of technical colleges, such as those arising from lack of skills to handle materials and production by graduates. In line with above statement, Obialor (2004) explained that wastage connotes a deliberate inadvertent discarding of a useful material or asset, allowing of material to be unused, wrong use of material, use of wrong material or underutilization of material (Nwimo, 2004).

**Low Productivity:** The output of the graduate is very low in production due to insufficient skills acquired. Rao (1992) observed that students in technical colleges have often not been given the skills they actually need as a result of this a fresh graduate of technical college, when confronted with practical project, would be at a loss as a means of correlating what they learned and what is required in practice. Such graduates find it difficult to become self-reliant or else they face unemployment scourge.

**Self-employed Graduate:** The major aim of establishing technical college in country is to enable graduate to be self-reliant to himself for earning a living and to contribute to the growth of socio-economy of the country. Okoro (2006) pointed out that technical college is the principal vocational institutions designed to prepare students in various occupation area for self-employment. According to Federal Ministry of Education (FME, 2004) the goal of technical college is to

produce graduate that can set up their own business and become self-employed and be able to employ others.

Metalwork involves activities in occupation that entail designing, processing and fabrication of metal products. These products include metal furniture, washing machines, refrigerator, automobile, bicycles and other metal products used in homes and offices (Oranu et al, 2002).

Metalwork is one of the trades established in technical colleges that have other components such as automechanic, welding, panel construction.

Technical and vocational education training (TVET) aims to develop human capital abilities regarding knowledge, skills, and understanding (Thompson, 2002). This implies that vocational technical education is a special education which prepare individual for work. It is aimed at equipping its recipients with occupational skills needed or both employment and self-reliance (Nwimo, 2004). According to Okorie (2001) vocational technical education is regarded as a wise economic investment. It is believed that through vocational technical education and training individuals will be trained to acquire saleable skills that will enable them to secure occupation which will be beneficial to them and the society. Okorie further argued that vocational technical education in Nigeria is the sector responsible for skill development. It is therefore necessary to plan the programme so as to supply the needed quantity and quality of labour and at the right time. Wastage in education could be traced to all levels of educational programme. Consequently, it has been realized that wastage exists in every aspect of education, such as vocational, special, science and general education (Salami, 1993). Wastage in vocational technical education therefore may be defined as the degree to which human and material resources developed and made available are grossly underutilized or neglected (Okorie, 2001). In such conditions, the output of the education system will not reflect the stated national objectives.

## **2.2 Factors that Lead to Wastage among Self Employed Metalwork Graduates**

Wastage in education has been a concern to world over, despite the study in some developing countries by UNESCO, educational wastage has been given much attention by educators in the developing countries, considering the amount of research and the concern shown for the problem. Educational wastage usually occurs between primary and secondary schools which resulted to drop-out and repetition. Ayodele (2000) observed that wastage rates are higher in lower classes than what obtained in upper classes. There is an indication that wastage arising from repetition and dropout occur in primary schools. Brunner and Paul (1971) cited in Ayodele (2000) described wastage as the degree to which the actual output fails to correspond with stated goals of education within a given period. The problem of wastage in education arises many developing nations as a result of high percentage of pupils who repeat classes and those who dropout of school.

According to Okorie (2000) it is a factor that will prevent the individual from desiring to become self-employed. But where he insists to be self-employed the result could be low productivity. Whatever opinion one may have about the effort of the society in eliminating education wastage, the quality an quantity of intellectual and skillful manpower need of the society through its educational system will be meaningful. This will be achieved only when a more accurate diagnosis of the problem of educational wastage is carried out in vocational technical education sector and appropriate remedies adopted (Nwomo, 2004).

## **2.3 Training activities for Retraining Self Employed Metalwork Graduates to Reduce Wastage**

Vocational education and job training program have been integral parts of national development strategies in many societies because of the impact on human resource development, productivity, and economic growth. Despite its proven contribution Nigeria does not seem to give vocational

education the attention it deserves; and that appears one of the reasons for the rising unemployment and poverty in the society (Akoroda, 2002).

#### Training Activities for Retraining Self Employed Metalwork Graduates to Reduce Wastage

- i. Invite speakers from relevant establishment to give talk on innovations in metalwork technology.
- ii. Giving the self-employed graduates grants to further their study
- iii. Retrain self-employed metalwork graduates on proper handling of metalwork materials and equipment.
- iv. Give self-employed metalwork graduates talk on general safety practice necessary in the work.
- v. Upgrading of self-employed metalwork graduates so as to meet up the modern technology.
- vi. donate a lot of safety materials while in training
- vii. Giving self-employed metalwork graduates capital to buy modern equipment and machines after training.
- viii. Invite experts from metal industries to give talk on current issues in metalwork on

#### **2.4 Organization of Workshops/working Environment for Self-employed Metalwork Graduates to reduce Wastage**

One of the management principles is organizing. To organize is to ensure that all human material resources required are available and arranged in such that it will enhance good working relation, effective communications and proper co-ordination to execute the programme (Akinrotahun, 2000). It is the responsibility of teachers or owner of the workshops to organize the laboratory tools, machines and other material resources to enhance safety, security and proper utilization of material resources. Organization could be regarded as a process of dividing programme into

related activities or units and assigning a relevant person (student) under leaders for the accomplishment of the objectives (Ivowi, 2012). Proper organization of tools, equipment, instruments, and working environment could reduce wastage in technical education.

Organizing, in ademulegun and Afolabi (2002) is the management process of assigning the task developed during planning to individuals within the framework management in order to achieve the stated objectives. It is a means of putting plans into actions. When individuals are given some tasks, the success of the individuals is the success of the unit which results in the success of the department and finally to the overall success of the management due to efficient organization (Akinrotohun, 2000).

In organizing technical education, tools, machines and other materials for effective management, the following principles should be considered: machines and tools should be organized in sequence like uses, sizes and colour for ease of reference and accountability, proximity to users should be of high priority, lost or damaged tools should be replaced for continuity of the programme, tools should be arranged so that teachers can inspect and identify immediately, worn out, broken and lost tools. Careless loss of tools and materials due to pilfering and vandalization must be checked constantly and waste must be minimized (Okorie, 2000).

To consider human resources, that is the teacher, students and non-teaching staff. Make sure that jobs and assignments are given to students using the available material resources to achieve maximum efficiency. The training equipment and working environment (i.e workshop/laboratory) should be organized in order that equipment/materials and supplies may be received and checked without the interruption of other tasks. When the equipment, tools, and machines are well organized in a working environment, it will enhance bridging gender imbalance in technical education.

In practical class/lesson the step should be to know the quantity of materials available for the lesson and whether these materials will meet the needs of the lesson (Nwachukwu, 2001). These available materials should be carefully assessed to ensure that they cover the needs of all workshop classes. If materials are found in adequate, useful effort should be made to place orders for more materials. Proper inventory of the tools, equipment and materials should be kept to regulate their usage. It is usually necessary to ensure that all available materials and equipments are carefully assembled before using them. This workshop experience should also be such that they will require the use of simple materials that are relatively familiar to the individuals and simple to use. It is also necessary to ensure that adequate information is made available to students on the use of these materials and equipment.

The organization and administration of a workshop should be concerned with planning, designing and arranging the physical facilities in order to attract the attention of inquisitive learners because the facilities and their settings are impressive.

Students should be exposed to all necessary tools and equipment required in the trades so that they do not find them strange when required to work with them in industries after graduation. a task performed efficiently using a given set of tools and equipment could be an hazardous task when using unfamiliar ones. This makes field trips necessary so as to introduce student to industrial equipment if the training institutions are not equipped to industrial standard. The above statement is a support of the theories of work-experience as propounded by Olaitan, Nwachukwu, Onyemachi, Igbo and Ekong (1999). The first two of the ten theories state thus;

1. Work-experience will efficient in proportions as the environment in which the learner is trained as a replica of the environment in which the learner must subsequently work.

2. Work-experience can only be achieved where the training jobs are carried out the same way with the same operations, the same tools, and the same machines as in occupation itself.

Olaitan (1996) stated that the problem of inadequate training facilities requires some focus. Technology development advances daily in some developed countries such that a piece of equipment becomes obsolete in a matter of months. The industrial sector, being profit-oriented is always on the lookout for technological advances that could increase their profit margin in less time with greater labour efficiency. In the country today, technical colleges, as is characteristic of depressed economics are hardly able to renew their facilities to keep pace with technological progress. The trainees from these institutions enter the world of work only to discover that the equipment with which they were trained have been modified or at times have drastically deviated from those on which training occurred. Machines and work areas must be properly placed to allow a normal sequence of operation with a minimum of cross traffic. Generally materials move from delivery to storage, to machines for sizing, to bench area for processing and fabricating, to finishing. Machines and tools must have sufficient access to permit their maintenance as well as operation (Ezeji, 2004).

In order to close the significant gender gap in technical and vocational education, proper training and work environments were needed. The workplace atmosphere and training should be appropriately planned. Location of machines and equipment locations should take special care to avoid interfering with nearby instructional activities.

## **2.5 Working Methods and Procedures for Self Employed Metalwork Graduates to reduce Wastage**

Workshop environment is the introduction of industry in learning situation as demanded by the socio-economic needs of the people. School workshop brings about technology of industry in educational curriculum in which students are exposed to practical learning situations for optimum utilization of their potentials, abilities, creative imagination and aptitude in using available materials and tools for production works (Olson, 1992 and Nwachukwu, 2001). Technology of industry has to do with methods, processes and procedures of doing, using and making things (FME, 2004).

Workshop procedures should be same as the procedures of industry (Olson, 1992) in the same vein, workshop procedure in metalwork technology programmes should be same as procedure in metalwork industry, which should reflect workshop procedures in technical education programmes. Procedure as noted is the conventional and correct way of doing something. In relation to workshop procedures in metalwork technology, procedure can be seen as the correct and accepted ways of deriving set objective of the programmes from planned and systematic follow-up of activities designed for the purpose. According to Nwachukwu (2001) procedures in workshop activities are process-based. Workshop process and procedure therefore can be seen as series of activities of work performed in correct and accepted way so as to get at a particular and designed result.

But these processes are in conformity with the initial procedures in the order of metalwork laboratory activities. Management in the school workshop or laboratory has to do with the process of bringing out the best from the laboratory personnel so as to achieve the objective of metalwork technology programme. According to Ogwo and Oranu (2006) for effective laboratory

management to be achieved, the teacher demands a high degree of resourcefulness, creativity and sense of devotion. They further added that the sole aim of good workshop management is to maintain prescribed standards of conduct essential for efficient, teaching and class participation in learning process.

According to Ede (2001) shop organization as a procedures followed by instill the students the type of co-operative effort necessary to function effectively and efficiently. He further emphasized that it covers shop or laboratory maintenance, tools supplies, inventory, safety and work assignment. Therefore metalwork laboratory facilities should be organized in order that materials, tools and equipment may be received and checked easily. It will facilitate enabling environment for teaching and learning which gear towards understanding needed for management in metalwork.

According to Akinrotohum (2000), to organize is to ensure that all the human and materials resources required are available and arranged that they will enhance good working relations. In organizing facilities by a student carrying a project of metal work, the emphasis should be on tools, machines, materials, equipment supplies and tasks in the workshop activities. Organization of activities to be executed can be in form of a work schedule chart or job sheet. This is inform of list of activities in sequence, the materials, tools and machines to work on and the days and time frame execution.

## **2.6 Entrepreneurial Skill Training required to reduce Wastage**

Entrepreneurial skills relate to the individual performance, such as the work of the entrepreneur or the staff, and successful business owners think that the environment and its shifting dynamics may be controlled and managed for business development. It refers to the full spectrum of business issues that entrepreneurs are capable of resolving (Tolentino, 2018).

There are different views as to what make one a successful entrepreneur. Some people contend that entrepreneurs are born with entrepreneurial traits. In other words, family background is essential to success for entrepreneur while others believe that entrepreneurs are made, not born. According to them, persons with proper knowledge and skills acquired through education and experience can become a successful entrepreneur (Nwachukwu, 2005). A competent self-employed entrepreneur must therefore be able to use knowledge, attitude, and skills in such a way as to be able to deal effectively with tasks, problems dilemmas and contradictions resulting from heavy competitions or changing demands of customers.

Tolentino, in Zaharaddeen et al (2006), then highlighted some of the personality competencies to include: self-confidence, strong will power, risk taking ability, leadership skill, originality, innovation and future oriented. He further stressed that successful entrepreneurs (technicians) must possess this personality competencies which enable the individual to start a new business or expand on an existing enterprise.

The common wealth of Virginia (2007), highlights on the following personality competencies. These include;

1. **Interpersonal communication:** This is the ability to persuade and discuss with customers, clients, suppliers, competitors, service providers and other stakeholders in the business environment. This ability will enable the entrepreneur to be able to comprehend the need expectations, apprehensions and requirements of others.
2. **Networking:** This is the ability to establish linkages with another business persons and stakeholders for mutual learning, collaborative undertakings and joint activities aimed at achieving common objectives. Thus, entrepreneurs have their own community of practice with which they must relate. They further stressed that entrepreneurs will be confronted at

the societal level with developments like growing competition, extension of communication technology, improved quality standard of service, a more complex range of work process and technologies, innovation another value added service to the customers. All of these will however demand the entrepreneur's ability to network in order to meet up with the challenges.

3. **Customer Service:** This has to do with the ability to fulfilling the needs of customers. It enables the entrepreneur to anticipate customers need, provide services in a respectful manner, deliver service accurately and on time, establish and maintain effective contacts with customers. They further stressed that this competency will enable the entrepreneur to empower his/her employees to improve service delivery strategies and to obtain data to measure customer satisfaction.
4. **The result focus:** This is the ability to attaining the goals and objectives of the enterprise. Specifically, it enables the entrepreneur to pursue work with energy, drive and need for completion. Hence the entrepreneurs apply innovative ideas, adopt to varying work situation, take initiative with clear business purpose in mind, and continually seeks to improve business process.
5. **Team work:** This is the ability to collaborating and cooperating to get jobs done in the industry. It enables the employees to have value for the inputs and know-how of other employees. Thus, this competency enables the technicians to ask for help when needed, build trust and respect among fellow employees. Specifically, it enables the entrepreneur to create an environment in which team members share both risks and rewards. Tolentino (1998) also added that building a team is so important for a starting entrepreneur. Thus delegating responsibilities to a team of employees or external consultants enable the

entrepreneur to focus on his/her own core competencies. This also opens up ways to improve efficiency and generation of creative ideas in the management of small scale automobile maintenance industry.

In his opinion, Kamarainen (2002), stressed that the personality competencies are applicable in broad range of entrepreneurial activities. Hence, technician venturing into the business can benefit immensely by acquiring and applying the skills in his/her daily operations. In the same vein, Nwachukwu (2003), noted that for one to succeed as an entrepreneur, a self-examination is required to determine how many of these personality competencies one possesses. Indeed, the road to success requires patience dedication, courage, imagination, decisiveness, and insatiable desire to achieve results. This demands selfless sacrifice especially during the gestation period of the enterprise. Therefore, to avert the consequences of failure which is a common feature of small businesses, self-employed metalwork graduates must endeavour to acquire some level of the entrepreneurial skills. These, however is a panacea to achieving greatness in the creation, owing and running the enterprise.

## **2.7 Skills Acquisition in Technical Colleges**

Metalwork Practice is one of the courses in technical colleges which is aimed at training skilled labour for self-reliance. Metalwork technology is a field of study that teaches individual how to make use of metal to produce different product for daily needs. Golden (2009), notes that skills encompass everything that students need to succeed in the competitive and increasing complex world. This implies for the need for effectiveness in the metalwork practices. Any enterprise and occupation require that individual acquires the necessary skills as well established habit of doing something and it involves the acquisition of practice and attitude to be able to do something well.

In metalwork practices: casting, joining, forming, forging, heat treatment, cutting, sanding and pattern development require skills to exhibit the knowledge to select production stages effectively. Skills acquisition is one of the surest ways through which young people can find their ways into the labour market either in the public or private sectors. Osuala (2004), defined skill as the ability to perform expertly, facilitate performance during employment. Michael (2004), notes that skill is an individual capability to control element of behavior, thinking and feeling within specified content and within particular task domain. Advance in technology have rendered metalwork skills inadequate for work in metal process industry; while creating needs for new and often sophisticated skills. This is because metal products are coming with new devices as a result of technological advancements. With the seemingly rapid growth in metal users in Nigeria today, there is need to improve skills of the workforce needed for metal industry. Amusa (2009), opines to become a skill metalworker extensive on-the-job experience is required to understand the symbols, metal properties, and electricity. In this era of computer, robotic and computer aided manufacturing these require more than a basic understanding of the metalwork process. Amusa (2009), further opined that courses in drafting, blueprint, reading, mathematics, computer science and physics are also required and valuable. This will make them employable either personally or institutionally.

Sustainable employability skills are referred to as those skills that enable an individual to acquire and keep a job (Akpan 2003). There are numerous lists that focused on the topics of personal image, attitude, habits and behavior, techniques of communication, problem-solving, decision making; management and organizational processes. Sustainable employability skills are important on the job and must be taught in the schools.

From the forgoing, it is necessary to note that skills are very important to life. For any nation to survive, the provider of goods and services must be skilled at a rate that should improve the living standard of the people. The need arises to sustain the pace of development in metal industry in Nigeria and the metal work programme need to inculcate in the graduates the skills needed to sustain the economic reality for sustainable employment in Edo State of Nigeria.

## **2.8 Structure of Educational System**

Nigeria's educational system was set up in a way that made vocational technical education a contentious topic. Okoro (1999) said that a detailed assessment of the Nigerian educational system's Vocational Technical Education sector reveals that it has not been given enough significance, which has resulted in a poor public perception of vocational technical education. According to Omoregie (1989), there has been debate regarding the role of the vocational technical education system in Nigeria's educational structure. To support his claim, he used the phrases "systems dead-end" and "systems link up."

Nwimo (2004) illustrated the Nigeria case using two models, he took a critical view of two systems of education in examining the issues. The first is the old 6-5-4 system while the second is the new 6-3-3-4 system. According to him, the old 6-5-4 system was marked by a pyramidal structure with a large percentage of drop-out. The three-year vocational school that follows primary education provides artisan training and thereafter lose all links with other parts of the system, parallel to the three-year modern schools which feeds into the technical college for craftsmen training and later becomes also a system dead-end. In this statement, therefore, structure of educational system was not in proper shape thereby leading to wastage in education and the dropout and dead-end are parts of sources of wastage in education.

The structure of vocational technical education in Nigeria is fragmented into four levels of education. The curriculum meant for vocational technical education has three components, namely general education, trade practice/theory and related studies and industrial training (Okoro, 2001). The National Policy on Education stated that the junior secondary school will be both pre-vocational and academic. According to Olaitan (2000) the curriculum is structured as follows: core subjects, which include Mathematics, English, Nigerian languages, Science, Social Studies, Art and Music, Practical Agriculture, Religious and Moral Instruction, Physical Education and Pre-vocational subjects.

The senior secondary school is for those able and willing to have a complete six-year secondary education. The curriculum at the technical college is planned along the structure of the discipline approach. In the higher education programme, emphasis is placed on maintenance culture; this helps to enhance the longevity and effectiveness of the machine (Nwimo, 2004).

## **2.9 Review of Related Empirical Studies**

The study found that no research on the factors that contribute to low productivity among self-employed metalwork trade graduates in Niger State had been done in my locality. There are, however, some works in related subjects that are pertinent to the topic. The linked reviews that are pertinent to the study are listed below.

Elobuike (1999) conducted a study on the relevance of technical college electrical/electronic and mechanical/automobile programmes to the needs of the industries. This study was a survey that covered Anambra, Ebonyi and Enugu States of Nigeria and the population comprised 477 technical college graduates and 503 industrial supervisors. The questionnaire was the main instrument used for data collection. From the study, it was revealed that graduates of technical college electrical/electronic and mechanical/automobile programmes were deficient in practical skills

needed for first employment in industries, although, they possessed good work attitudes needed for first employment in industries. The implication of Elobuiké's study to the present study is the identification of lack of practical skill by graduates of technical college which is one of the major wastage factors that militate against low productivity among self-employed graduates of technical college in metal work technology.

Another study was carried out by Adebisi (2009) on the availability and utilization of consumables. The study conducted in six government technical colleges in Ogun, Osun and Oyo States Southwest of Nigeria. Descriptive survey research design was used for the study, the purpose of the study was to determine the adequacy and utilization of training materials as correlates of technical college student's employability in Nigeria. The sample of the study comprised of three hundred final year students who have completed their student's industrial work experience scheme and thirty technical teachers were randomly picked from the six technical colleges to assess the availability and utilization of training materials. Two sets of questionnaires were used to elicit data on quality and quantity of training materials and graduates employability. The data for the study was analyzed using Pearson Product Moment Correlation Co-efficient  $r$  between students utilization to training materials and employability was estimated to be 0.77 ( $P > 0.05$ ). This implies that there is positive relationship between the utilization of training materials and student's employability. Though the relationship is not significant at 0.05 alpha levels. The result shows that a unit change in utilization of training materials will result to 0.77 increases in students employability. This indicates how crucial the availability and the level of its utilization are in any organization. Particularly technical colleges. This show that the level of resources available for a programme will determine to large extent the student's employability.

The study also revealed that through well-structured work-study experience programme, wastage of human resource would be minimized. The implication of this study to the present study if the work-study is well organized, planned and structured the students will actually acquire the relevant skill that would assist them in gaining benefit employment.

## **2.10 Summary of Review of Related Literature**

Different perspectives on waste were considered, but they all centered on a single idea, meaning, or kind of waste, such as direct and indirect waste. The theoretical framework emphasized the primary goals of technical education and the goals of the training environment in workshops. The theories of learning transfer, skill acquisition, and work-based learning examined how skills might be gained as a way of life and a lifelong learning with its dynamic nature in step with societal developments.

A review of teaching strategies, educational exercises, and resources pertinent to Metalwork Technology workshop activities was conducted. The four teaching strategies include field trips, project-based learning, activity-based learning, and demonstrations. Project work, practical task assignments, technical information production work, safety precautions, and field trips were among the instructional activities that were reviewed. Tools, equipment, instruments, and human and material resources were all included in the facilities mentioned.

A analysis of certain similar studies revealed shortcomings in programs for vocational technical education that prevented students from developing their skills. Additionally, it was found that enough skill acquisition is necessary given the rate of technological advancement and the unemployment rate in Nigeria at the moment. The lack of marketable skills led to waste and made technical graduates unemployed

## **CHAPTER THREE**

### **3.0 RESEARCH METHODOLOGY**

This chapter describes the procedure for carrying out the study. The study will be carried out under the following heading-design of the study, area of the study, population for the study, instrument for data collection, validation of the instrument, reliability of the instrument, method of data collection and methods of data analysis.

#### **3.1 Research Design**

The study adopted survey research design. According to Ezeji (2001) survey research is one which involves the assessment of public opinion using questionnaire and sampling method. Survey design is considered suitable for the study because the study seeks opinion of technical teachers and self-employed graduates of Metalwork trade so as to determine the strategies for reducing wastage among self-employed metalwork graduates in Niger State.

#### **3.2. Area of the Study**

The study was conducted in Niger State. The study covered four Technical Colleges and self-employed graduates of metalwork technology in the state.

#### **3.3 Population for the Study**

The population for the study comprised 50 respondents. These respondents will involve 20 technical teachers and 30 self-employed graduates of metalwork in major towns in Niger State. 10 technical teachers from Chanchaga GTC, seven technical teachers from Bida GTC, eight from Kontogora GTC. Ten self-employed graduates were selected from western senatorial district, eight from southern senatorial district and seven from Minna central. The total population of 50 was used for the study. There was no sampling as the population of the study is not large to be managed.

### **3.4 Sample and Sampling Technique**

There will be no sampling involve since the population is small, the entire population will be used for the study

### **3.5 Instrument for Data Collection**

The instrument for data collection in this study was a structured questionnaire designed to elicit needed information from the respondents. The questionnaire was made up of items reflecting on the strategies to improve wastages among self-employed metalwork graduates in Niger state.

### **3.6 Validation of the Instrument**

The instrument for the study was subjected to face-validation by three experts in Industrial Technical Education Section in the Department of Industrial And Technology Education, Federal University of Technology, Minna. Their suggestion was used to modify and produced final copy of the instrument that was used for the data collection.

### **3.7 Administration of the Instrument**

The Cronbach Alpha coefficient method was used to determine the internal consistency of the instrument. It was determined by administering questionnaire to 8 selected technical teachers and 10 self-employed graduates of metalwork in Niger State. The data obtained from the administration of the questionnaire were analyzed using Statistical Package for Social Science (SPSS).

### **3.8 Method of Data Analysis**

The research questions were answered using Mean while ANOVA was used to test the null hypotheses 1, 2, 3, 4 and 5 at 0.05 level of significance and at relevant degree of freedom. Any item with Mean value equal to 3.50 or above was regarded as agree while any item with Mean below 3.50 was regarded as disagree. A null hypothesis was accepted when a calculated value is

less than the table t-value, otherwise rejected. The instrument is based on a five-point Likert scale.

The scale is assigned values as shown below:

Responses	Scores	Range
Strongly Agree (SA)	5	4.50 – 5.00
Agree (A)	4	3.50 – 4.49
Undecided (U)	3	2.50 – 3.49
Disagree (D)	2	1.50 – 2.49
Strongly Disagree (SD)	1	0.50 – 1.49

## CHAPTER FOUR

### RESULT AND DISSCUSSION

#### 4.1 Research Question 1

What are the factors of wastage among self employed graduates of technical colleges?

The data for answering research question 1 are presented in Table 1.

**Table 1**

#### **Mean Responses of the Respondents on the Factors of Wastage among Self Employed Graduates of Technical Colleges**

N = 50

S/N	Item Statements	Mean	SD	Remarks
1	Lack of qualified technical teachers in schools	3.80	0.98	Agree
2	Inadequate vocational guidance for students in schools	4.10	0.83	Agree
3	Inadequate working experience	4.38	0.77	Agree
4	Poor condition of service of technical teachers	3.60	0.70	Agree
5	Inadequate curriculum coverage	3.52	0.64	Agree
6	Lack of saleable skills by the students after graduation	3.61	0.72	Agree
7	Students failure to adjust to learning while in schools	4.30	0.67	Agree
8	Inadequate teaching periods applied by the teachers amounted to wastage	4.26	0.72	Agree
9	Inappropriate methods of assessing students performance in practical while in schools	4.32	0.62	Agree
10	Employment into a different job area	4.26	0.85	Agree
11	Problems of unemployment	3.20	0.90	Disagree
12	Lack of motivation among the students while in schools	4.66	0.62	Agree

The data presented in Table 1 revealed that 11 out of 12 factors of wastage have their Mean values ranged from 3.52 to 4.66. This showed that the Mean value of each item was above the cut-off point of 3.50, indicating that there were only 11 factors of wastage among self employed graduates of technical colleges in Niger State. The table also showed that the standard deviations (SD) of the items are within the range of 0.62 to 0.98, this indicated that the Mean values of the respondents were not far from one another in their responses.

#### 4.2 Research Question 2

What are the training activities for retraining self employed metalwork graduates to reduce wastage?

The data for answering research question 2 are presented in table 2.

**Table 2**

#### **Mean Responses of the Respondents on the Training Activities for Retraining Self-Employed Metalwork Graduates to Reduce Wastage**

N = 50

S/N	Item Statements	Mean	SD	Remarks
1	Invite speakers from relevant establishment to give talk on innovations in metalwork technology	3.63	0.81	Agree
2	Giving the self employed graduates grants to further their study	4.28	0.90	Agree
3	Retrain self employed metalwork graduates on proper handling of metalwork materials and equipment.	3.80	0.69	Agree
4	Give self employed metalwork graduates talk on general safety practice necessary in the work	4.62	0.60	Agree
5	Upgrading of self employed metalwork graduates so as to meet up the modern technology	4.28	0.70	Agree
6	Donate a lot of safety materials while in training	4.22	0.86	Agree

7	Giving self employed metalwork graduates capital to buy modern equipment and machines after training.	4.34	0.84	Agree
8	Invite experts from metal industries to give talk on current issues in metalwork on the radio or television.	4.52	0.61	Agree
9	Visit the workshops of metalwork graduates with relevant write ups relating to the field.	3.61	0.70	Agree
10	Give the specifications of the materials to be used for a given job	3.51	0.81	Agree
11	Allow some experienced self employed metalwork graduates to teach each other on current issues in metalwork.	3.52	0.64	Agree
12	Organize field trip for all the self employed metalwork graduates in the state in order to learn new things in metalwork.	4.38	0.60	Agree

The data presented in Table 2 revealed that 8 training activities have their Mean values ranged from 3.51 to 4.62. This showed that the Mean value of each item was above the cut-off point of 3.50, indicating that all the 8 training activities were required for retraining self employed metalwork graduates in order to reduce wastage. The table also showed that the standard deviations (SD) of the items are within the range of 0.61 to 0.90, this indicated that the mean values of the respondents were not far from one another in their responses.

### 4.3 Research Questions 3

How workshops/working environment should be organized by self employed metalwork graduates to reduce wastage.

The data for answering research question 3 are presented in Table 3.

### Table 3

**Mean Responses of the Respondents on How Workshops/Working Environment should be organized by Self Employed Metalwork Graduates to Reduce Wastage**  
**N = 50**

S/N	Item Statements	Mean	SD	Remarks
1	Organized machines and tools in a sequence separately	4.24	0.68	Agree
2	Arrange facilities to enhance security of the laboratory	3.52	0.70	Agree
3	Store the materials in a cabinets or pigeonhole boxes	4.30	0.73	Agree
4	Lavatories for washing hands after work should be provided near the workshops.	4.14	0.78	Agree
5	Arrange all material resources in the laboratory in conformity with safety regulations	4.22	0.78	Agree
6	Separate power tools/machines from other tools.	4.18	0.71	Agree
7	Arranging the equipment in order of utilization	3.50	0.67	Agree
8	Arranging metalwork equipment in such a way that supervisors can easily inspect and identify immediately worn out, broken and lost ones.	4.40	0.66	Agree
9	organizing tools and equipment based on institutional plan.	4.68	0.58	Agree
10	Organizing metalwork equipment needed for practical activities in the workshop	3.52	0.57	Agree

The data presented in Table 3 revealed that all the 10 items on how workshops/working environment should be organized by self employed metalwork graduates to reduce wastage have their Mean values ranged from 3.50 to 4.68. This showed that the Mean value of each item was above the cut-off point of 3.50, indicating that the workshops/working environment of self employed metalwork graduates can be organized in al the 10 ways to reduce wastage. The Table also showed that the standard deviations (SD) of the items are

within the range of 0.57 to 0.78, this indicated that the Mean values of the respondents were not far from one another in their responses.

#### 4.4 Research Question 4

What are the working procedures to be adopted by self employed metalwork graduates to reduce wastage?

The data for answering research question 4 are presented in table 4

**Table 4**

**Mean Responses of the Respondents on Working Procedures to be adopted by Self Employed Metalwork Graduates to Reduce Wastage**

N = 50

S/N	Item Statements	Mean	SD	Remarks
1	The making of good pattern development of the products	4.40	0.69	Agree
2	Performing various operations in an appropriate logical sequence	3.54	0.76	Agree
3	Making good use of various sheet metal machines and equipment	4.54	0.61	Agree
4	Estimating the bending allowance for products that require bending	4.28	0.70	Agree
5	Performing soldering operation	3.80	0.75	Agree
6	Selecting a suitable joining method	4.34	0.65	Agree
7	Carrying out reverting operation correctly	3.68	0.67	Agree

The data presented in Table 4 revealed that 7 working procedures have their Mean value ranged from 3.52 to 4.54. This showed that the Mean value of each item was above the cut-off point of 3.50, indicating that all the 7 working procedures can be adopted by self

employed metalwork graduates to reduce wastage. The Table also showed that the standard deviations (SD) of the items are within the range of 0.61 to 0.76, this indicated that the Mean values of the respondents were not far from one another in their responses.

## Testing of Hypotheses

### 4.5 Hypothesis 1

There is no significant difference between the mean responses of metalwork teachers, experienced and less experienced self employed metal work graduates on the determinants of wastage among self employed graduates of technical colleges.

The data for testing  $H_{01}$  are presented in Table 6.

**Table 6**

**The Analysis of Variance (ANOVA) of the Mean Responses of the Respondents on the Determinants of Wastage among Self Employed Graduates of Technical Colleges**

Sources of Variance	Sum of Squares	df	Mean Square	F-cal	F-critical	Remarks
Between Groups	0.951	2	0.475	0.789	2.00	NS
Within Groups	28.329	47	0.603			
<b>Total</b>	29.280	49				

The result in Table 6 indicated that calculated  $F_{cal} = 0.789$  was less than the Table  $F_{critical}$  of 2.00 at 0.05 level of significance and degree of freedom 2 and 47. This revealed that there was no significant difference between the mean responses of metalwork teachers,

experienced and less experienced self employed metal work graduates on the determinants of wastage among self employed graduates of technical colleges.

Therefore, the null hypothesis of no significant difference in the mean responses of metalwork teachers, experienced and less experienced self employed metal work graduates on the determinants of wastage among self employed graduates of technical colleges was upheld.

#### **4.6 Hypothesis 2**

There is no significant difference between the mean responses of metalwork teachers, experienced and less experienced self employed metal work graduates on the training activities to be organized for retraining self employed metalwork graduates to reduce wastage.

Data for testing  $H_{02}$  are presented in Table 7.

**Table 7**

**The Analysis of Variance (ANOVA) of the Mean Responses of the Respondents on the Training Activities to be Organized for Retraining Self Employed Metalwork Graduates to Reduce Wastage**

Sources of Variance	Sum of Squares	df	Mean Square	F-cal	F-critical	Remarks
Between Groups	1.063	2	0.532	0.535	2.00	NS
Within Groups	46.717	47	0.994			

<b>Total</b>	47.780	49				
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The result in Table 7 indicated that calculated  $F_{cal} = 0.535$  was less than the Table  $F_{critical}$  of 2.00 at 0.05 level of significance and degree of freedom 2 and 47. This revealed that there was no significant difference between the mean responses of metalwork teachers, experienced and less experienced self employed metalwork graduates on the training activities to be organized for retraining self employed metalwork graduates to reduce wastage.

Therefore, the null hypothesis of no significant difference in the mean responses of metalwork teachers, experienced and less experienced self employed metal work graduates on the training activities to be organized for retraining self employed metal work graduates to reduce wastage was upheld.

### **Findings of the Study**

The following findings emerged from the study based on the research questions and hypotheses.

#### **A. The following are the Determinants of Wastage among Self Employed Graduates of Technical Colleges**

1. Lack of qualified technical teachers in schools
2. Inadequate vocational guidance for students in schools
3. Inadequate working experience
4. Poor condition of service of technical teachers
5. Inadequate curriculum coverage

6. Lack of saleable skills by the students after graduation
7. Students failure to adjust to learning while in schools
8. Inadequate teaching periods applied by the teachers amounted to wastage
9. Inappropriate methods of assessing students performance in practical while in schools
10. Employment into a different job area
11. Lack of motivation among the students while in schools
12. Failure to admit the interested candidates into the system

**B. The following are the Training Activities for Retraining Self Employed Metalwork Graduates to Reduce Wastage**

1. Invite speakers from relevant establishment to give talk on innovations in metalwork technology.
2. Giving the self employed graduates grants to further their study
3. Retrain self employed metalwork graduates on proper handling of metalwork materials and equipment.
4. Give self employed metalwork graduates talk on general safety practice necessary in the work.
5. Upgrading of self employed metalwork graduates so as to meet up the modern technology.
6. donate a lot of safety materials while in training
7. Giving self employed metalwork graduates capital to buy modern equipment and machines after training.
8. Invite experts from metal industries to give talk on current issues in metalwork on the radio or television.

9. Visit the workshops of metalwork graduates with relevant write ups relating to the field.
10. Give the specifications of the materials to be used for a given job
11. Allow some experienced self employed metalwork graduates to teach each other on current issues in metalwork.
12. Organize field trip for all the self employed metalwork graduates in the state in order to learn new things in metalwork.

**C. How Workshops/Working Environment should be Organized by Self Employed Metalwork Graduates to Reduce Wastage**

1. Organize machines and tools in a sequence separately
2. Arrange facilities to enhance security of the laboratory
3. Store the materials in a cabinets or pigeonhole boxes
4. Lavatories for washing hands after work should be provided near the workshops.
5. Arrange all material resources in the laboratory in conformity with safety regulations.
6. Separate power tools/machines from other tools.
7. Arranging the equipment in order of utilization
8. Arranging metalwork equipment in such a way that supervisors can easily inspect and identify immediately worn out, broken and lost ones
9. Organizing tools and equipment based on institutional plan
10. Organizing metalwork equipment needed for practical activities in the workshop.

**D. The following are the Working Procedures to be adopted by Self Employed Metalwork Graduates to Reduce Wastage**

1. The making of good pattern development of the products

2. Performing various operations in an appropriate logical sequence
3. Making good use of various sheet metal machines and equipment
4. Estimating the bending allowance for products that require bending
5. Performing soldering operation
6. Selecting a suitable joining method
7. Carrying out riveting operation correctly

### **Discussion of Finding**

The findings of this study revealed that there are 12 factors of wastage among self employed graduates of technical colleges. These factors include: lack of qualified technical teachers in schools, inadequate vocational guidance for students in schools, inadequate working experience, poor condition of service of technical teachers, inadequate curriculum coverage, lack of saleable skills by the students after graduation, students failure to adjust to learning while in schools, inadequate teaching periods applied by the teachers amounted to wastage and inappropriate methods of assessing students' performance. These findings were in agreement with the opinion of Opara (1992) that inadequate working experience, poor condition of service of teachers teaching technical subjects, inadequate curriculum coverage are those factors that have amounted to wastage among technical practitioners.

The findings of this study revealed 12 training activities to be organized for retraining self employed metalwork graduates to reduce wastage. These training activities include: invite speakers from relevant establishment to give talk on innovations in metalwork technology, giving the self employed graduates grants to further their study, retrain self employed

metalwork graduates on proper handling of metalwork materials and equipment, given self employed metalwork graduates talk on general safety practice necessary in the work, upgrading of self employed metalwork graduates so as to meet up the modern technology and donate a lot of safety materials while in training. These findings were in agreement with the opinion of Nwaobase (2005) that upgrading of self employed metalwork graduates to meet up the modern technology is one of the strategies for reducing wastage.

The study also found out that the respondents agreed on how workshops/working environment should be organized by self employed metalwork graduates to reduce wastage. How workshops and working environment should be organized to reduce wastage as identified by the respondents include arrange facilities to enhance security of the laboratory, store the materials in a cabinets or pigeonhole boxes, lavatories for washing hands after work should be provided near the workshops, arrange all materials resources in the laboratory in conformity with safety regulations, separate power tools/machines from other tools, arranging the equipment in order of utilization, arranging metalwork equipment in such a way that supervisors can easily inspect and identify immediately worn out, broken and lost ones, organizing tools and equipment based on institutional plan and organizing metalwork equipment needed for practical activities in the works.

The study also found out that the respondents agreed on all working procedures to be adopted by self employed metalwork graduates to reduce wastage. How workshops and working environment should be organized to reduce wastage as identified by the respondents include performing various operations in an appropriate logical sequence,

making good use of various sheet metal machines and equipment, estimating the bending allowance for products that require bending, performing soldering operations according to the rules, selecting a suitable joining method, carrying out riveting operation correctly.

## **CHAPTER FIVE**

### **5.0 SUMMARY, CONCLUSION AND RECOMMENDATIONS**

#### **5.1 Summary of the Study**

This chapter contains the re-statement of the problem, summary of procedure used, the principal findings of the study, and implications of the study, conclusion, recommendations and the suggestions further study.

Technical colleges in Nigeria are established to expose individuals to skills in various trades or occupations such as Woodwork, Electronics, Electricity, Automobile Technology and Metalwork. The main emphasis for those specializing in Metalwork trade in particular should be the acquisition of the skills required for employment after graduation. Most of these graduates after spending three or more years in Technical Colleges acquired little or no skills for self-employment or to work in the industries. Iwuoha (1989) explained that most of graduates who specialized in metalwork in technical colleges are good in the theoretical aspects but the performance level in the practical is very low. These graduates therefore found it difficult to set up their businesses. Those who succeeded in establishing their workshops found it very difficult to attract customers. They cause more havoc to the work contracted to them and this amounted a

wastage. These may be as a result of lack of quality instruction received while in training. Hence the high rate of unemployment of technical college graduates persists. Olaitan (1996) remarked that in Nigeria where there are abundant resources, many craftsmen are found in the streets or towns and cities without jobs because their training is irrelevant or inadequate to societal needs. Therefore, it is only a practical oriented skill training programme geared towards self employment that could make graduates of Technical Colleges and other vocational institutions productive. Okorie (2000) observed that there is high rate of low level skill development in Nigeria technical colleges. Consequently, the graduates of these colleges do not possess the needed saleable skills to qualify them for employment. However, there are insufficient skills possessed by graduates of technical colleges which lead to the low output among self-employed graduates. Therefore, there is need to identify strategies for reducing wastage among self-employed metalwork graduates of technical colleges in Niger State. Specifically, the study determined;

1. Factors of wastage among self-employed metalwork graduates of technical colleges.
2. Training activities to be organized for retraining self-employed metalwork graduates to reduce wastage.
3. How workshops/working environment should be organized by self-employed metalwork Graduates to reduce wastage.
4. Working procedures to be adopted by self-employed metalwork graduates to reduce wastage.

## **5.2 Implications of the Study**

The findings of the study have implications for teachers, self-employed metalwork graduates and the government. The teachers of metalwork technology will be forced to make use of the findings of the study to prepare their students for work after graduation. Self-employed metalwork

graduates will make use of the identified working procedures in metalwork technology and how workshops should be organized in order to reduce wastage to a barest minimum.

### **5.3 Contribution to Knowledge**

1. Entrepreneurial skills should be incorporated into the curriculum of metalwork technology.
2. Seminars or workshops on how to reduce wastage should be also organized for self-employed metalwork graduates already in the field.
3. Modern training facilities should be donated to technical colleges by governments, philanthropists in the society and employers of the products of technical colleges

### **5.4 Conclusion**

Based on the finding of this study, the following conclusions were made: Technical colleges in Nigeria are established to expose individuals to skills in various trades or occupations most especially in Metalwork. The main emphasis for those specializing in Metalwork trade should be the acquisition of the skills for employment after graduation. Most of metalwork graduates after spending three or more years in Technical Colleges acquired little or no skills for self employment or to work in the industries. Those who succeeded in establishing their workshops found it very difficult to attract customers. They also cause more havoc to the work contracted to them and this amounted to wastage. The identified findings could be used to reduce the effect of this situation to the barest minimum.

### **5.5 Recommendations**

Based on the findings of this study, the following recommendations are made:

1. Curriculum of vocational and technical education programmes in technical colleges should be reviewed to meet up with modern needs/technologies in the society.

2. Workshop and seminars should be organized from time to time for technical colleges on how workshops, working environment should be arranged and organized properly for skill learning and wastage reduction, right working procedures to be adopted in the workshops and the entrepreneurial skill training necessary for equipping students under their guidance for future employment.
3. Fresh metalwork graduates should be retrained at skills acquisition centers in order to expose them to various working methods and skills for sustainable employment.
4. Scholarship, stipend and gifts should be given to metalwork technology students to stimulating their interest into vocational and technical education.

#### **5.6 Suggestion for Further Studies**

The following are suggested for further studies;

1. Strategies for reducing wastage among self-employed Metalwork graduates of Technical Colleges in should be carried out in other State.
2. Capacity building needs of teachers for effective teaching of metalwork technology to students in technical colleges.
3. Strategies for stimulating the interest of students in study technical courses such as woodwork, metalwork, automobile, building, electrical and electronic technology in technical colleges.

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**APPENDIX**

**QUESTIONNAIRE**

**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA**

**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY EDUCATION**

**METAL WORK TECHNOLOGY OPTION**

Dear respondent

This questionnaire is designed to elicit information from the respondents on Strategies Reducing Wastage Among Self-employed Metalwork Graduates of Technical Colleges in Niger state, Niger

Please, kindly give response on the question in the questionnaire to provide a data base for this study. Any information provided would be treated with confidentiality

**PART 1**

**PERSONAL DATA**

Please check appropriately as applicable to your status

- (a) Metalwork teacher
- (b) Less experienced self-employed graduate
- (c) Experienced self-employed graduate

Factors that led to the wastage among metal works graduate of technical colleges.

**Keys**

Strongly Agree (AS)

Agree (A)

Undecided (U)

Disagree (D)

Strongly Disagree (SD)

## PART 2

### Research Question 1

Please, indicate those factors that led to the wastage among graduate of technical colleges by checking (✓) in the appropriate column.

S/N	Item Statement	SA	A	U	D	SD
1	Lack of qualified technical teachers in schools					
2	Inadequate vocational guidance					
3	Inadequate working experience					
4	Poor condition of service					
5	Inadequate curriculum coverage					
6	Lack of saleable skills					
7	Students failure to adjust to learning while in schools					
8	Inadequate teaching periods					
9	Inappropriate methods of assessing students performance in practical					
10	Employment into a different job area					

11	Problem of unemployment					
12	Lack of motivation among the students while in schools					

### Research Question 2

Training activities to be organized for self-employed metalwork graduates to reduce wastage

Please, indicate training activities to be organized for self-employed metalwork graduates to reduce wastage by checking (✓) in the appropriate column.

S/N	Item Statement	SA	A	U	D	SD
1	Invite speakers from relevant establishment to give talk on innovations in metalwork technology					
2	Giving the self-employed graduates grants to further their study					
3	Retrain self-employed metalwork graduates on proper handling of metalwork materials and equipment.					
4	Give self-employed metalwork graduates talk on general safety practice necessary in the work					
5	Upgrading of self-employed metalwork graduates so as to meet up the modern technology					
6	Donate a lot of safety materials while in training					
7	Giving self-employed metalwork graduates capital to buy modern equipment and machines after training.					

8	Invite experts from metal industries to give talk on current issues in metalwork on the radio or television.					
9	Visit the workshops of metalwork graduates with relevant write ups relating to the field.					
10	Give the specifications of the materials to be used for a given job					
11	Allow some experienced self employed metalwork graduates to teach each other on current issues in metalwork.					
12	Organize field trip for all the self employed metalwork graduates in the state in order to learn new things in metalwork.					

### Research Question 3

Workshops/working environment is organized by self-employed metalwork graduates to reduce wastage.

Please, indicate Workshops/working environment should be organized by self-employed metalwork graduates to reduce wastage by checking (✓) in the appropriate column.

S/N	Item Statement	SA	A	U	D	SD
1	Organize machines and tools in a sequence separately					
2	Arrange facilities to enhance security of the laboratory					
3	Store the materials in a cabinets or pigeonhole boxes					
4	Lavatories for washing hands after work should be provided near the workshops.					

5	Arrange all material resources in the laboratory in conformity with safety regulations					
5	Separate power tools/machines from other tools.					
6	Arranging the equipment in order of utilization					
7	Arranging electrical/electronic equipment in such a way that supervisors can easily inspect and identify immediately worn out, broken and lost ones					
8	Organizing tools and equipment based on institutional plan					
9	Organizing electrical/electronic equipment needed for practical activities in the workshop					
10	Organizing all the electrical/electronic equipment in conformity with safety regulations during the lessons					

#### Research Question 4

Working procedures to be adopted by self-employed metalwork graduates to reduce wastage

Please, indicate working procedures to be adopted by self-employed metalwork graduates to reduce wastage by checking (✓) in the appropriate column.

S/N	Item Statement	SA	A	U	D	SD
1	The making of good pattern development of the products					
2	Performing various operations in an appropriate logical sequence					
3	Making good use of various sheet metal machines and equipment					

4	Estimating the bending allowance for products that require bending					
5	Performing soldering operation					
6	Selecting a suitable joining method					
7	Carrying out riveting operation correctly					

