# AN APPRAISAL OF OCCUPATIONAL SAFETY IN WELDING AND FABRICATION WORKSHOP IN NIGER STATE.

**BY**

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**2007/1/28548BT**

**DEPARTMENT OF INDUSTRIAL AND TECHNOLOGY**

**EDUCATION.**

**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA.**

**OCTOBER, 2012.**

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

**FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA.**

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**OCTOBER**

## CERTIFICATION

I, Ibrahim Mohammed Yakub with matric no 2007/1/28548BT, an under graduate student of the Department of Industrial and Technology Education, certify that the work embodied in this project is original and has not been submitted in part or full for any other diploma or degree of this or any other university.

_____ _____

Name Signature and Date

**APPROVAL PAGE**

This project has been read and approved as meeting the requirements for the award of B.TECH Degree in Industrial and Technology Education of the Department of Industrial and Technology Education. School of Science and Science Education. Federal university of technology, Minna.

_____ _____

Supervisor Signature and Date

_____ _____

Head of Department Signature and Date

_____ _____

External Supervisor Signature and Date

## DEDICATION

This research project is dedicated to Almighty Allah and my lovely parents Alhaji and Hajia Muhammed kutigi.

**ACKNOWLEDGEMENTS**

All praise and thanks are due to Almighty Allah of the whole universe. I sincerely acknowledge the assistance of my able research supervisor Mallam W.B. Kareem for sparing time to read, correct, offering thoughtful subjection to improve this project work generally. My gratitude extends to the Head of the Department of Industrial and Technology Education Dr E.J. Ohize. My sincere gratitude goes to my beloved parents Alhaji and Hajia Muhammed kutigi, my brothers and sisters Abubakar, Shettima, Muhammed, Fatimat, Aishat, for their prayers and wonderful role played during the course of these study. I would like to appreciate Alhaji Abdulkadir Mayaki and Mrs. Dupe Mohammed for the timely Help rendered during the cause of this project. I appreciate the encouragement and prayer enjoyed from the entire members of the Muslim student society of Nigeria (MSS) Federal University of Technology Minna and My lovely Brother Hussaini Mohammed (May his gentle soul rest in peace). I also acknowledge the effort of my friends who by one way or the other contributed to the success of this research project. I say thank you all and God Bless.

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**Abstracts**

This study was designed to investigate the current status of occupational safety in welding and fabrication workshop in Niger state, with a view to identify possible ways of ensuring welders and fabricators work safely in their workshops. To obtain information for the study, 3 research questions and 2 null hypotheses were formulated on how rules for welding and fabrication were been observed and effectively used, ways of promoting occupational health and safety practices in welding and fabrication workshop and the master trainers competency in the use of welding equipment. The sample for the study consisted of 50 trainees and 25 master trainers randomly selected from 5 towns in Niger state. A 37 items questionnaire was used to collect the data for the study. The result of their responses was analysed using frequency count, mean, standard deviation and t- test from the analysis. Pertinent findings were revealed among others. Safety enlightenment programs and induction courses on safety were been held in the towns. The study however, revealed that several rules for welding and fabrication are observed and effectively used. Maintenance culture for equipment and machine should be encouraged, workmen should be prohibited from making and receiving call while working. Based on this findings, It was revealed that possible ways of promoting occupational safety should be ensured and master trainers should be competent in the use of welding equipment and devices in order to impact the knowledge to the trainees.

# CHAPTER 1

# INTRODUCTION

## Background of the study

Occupational safety describe the total well being or the state of being physically and mentally healthy in our workshop, environment and so on. Different types of sickness or illness occur in our workshops, factories, environment these days and somehow leads to sudden death. Some people acquire permanent diseases such as Human immune virus (HIV), Severe acute respiratory syndrome (SARS) etc. while others acquire temporary or slight sickness which allow them not to be present in the workshop or not to be able to carry out perfect work in the workshop.

International labour organization (ILO 2005) observed that occupational safety is a discipline with a broad scope involving many specialized fields. In its broadest sense, it should aim at the promotion and maintenance of highest degree of physical, mental and social well – being of workers in all occupations. Prevention among workers of adverse effects on health caused by their working conditions, protection of workers in their employment from risks resulting from factors adverse to health, placing and maintenance of workers in an occupational environment adapted to physical and mental needs, and adaptation of work to humans.

Since 1950 the international labor organization (ILO) and the world health organization (WHO) share a common definition of occupational health. It was adopted by the international labor organization/world health organization committee on occupational health and safety at its first season in 1950. The definition reads "occupational health and safety should aim at the

promotion and maintains of the highest degree of physical, mental, social well-being of work is a departure from work health caused by their working condition, the protection of work in the employment from risk resulting from factor and adverse the health, the placing and maintenance of the work in an organizational environment adapted to his psychological capacities and to summarize the adaptation of work to man and each man to his job. Smith (1992) lamented that every year in United State, thousands of employees are killed on the job, many times that number die of work related diseases and million suffer a work related injury or health disorder. According to Barbar and Donovan (1988) the direct out of pocket cost to American in billions of dollars annually. Indirect cost, representing the money valve of damage equipment and materials, production delays and time losses of other workers not directly involve in the accident amount to billion per year. The direct out of pocket costs include medical hospital expenses, death benefits and workman's disability compensation claim as provided by state and federal laws. According to Oranu (1996) cited in Oke (2002), 17,000 worker are killed every year, over 20,000 workers received injuries, while 300,000 worker are permanently impaired the trend of injuries and diseases from work environment is particularly frightening in developing countries such as ours because of the absence of reasonable research into the economic implication of occupational accidents occasioned by epileptic accident report. On June, 1st 1977, the Sunday concord newspaper reported that a stamping machine crushed the head of a factory worker with primotex Nigeria limited, Suleja in Niger state. What went wrong? The 25 years old man was employed to clear the machine and he was killed in the cause of carrying out his duty when the machine was accidentally switched on by a colleague.

Similar pattern of accidents in workplace are absence in various industries and factories including welding and fabrication workshops in Niger State which is of the researchers concern.

National Association of welders in Niger State chapter (NAWNS) reported that between 2002 and 2003 over forty-seven casualties were injured and renders un-useful treatment to them and to the society. This number include supervisor and apprentices/trainees. These accidents occurred due to lack of safety in the workshop. NAWNS (2002) reported how an apprentice died on 14th September, at about 16:45hours while carrying out a welding work and in cause of cutting metal with guillotine mistakenly cut off his finger and was rushed to the hospital which rendered him to loose three of his fingers. Several cases of this type rendered many welders and fabricators useless for themselves and the society at large. Another report in paiko Niger State revealed that an 18 years old apprentice during fabrication of bolt and nut was affected in his left eye due to lack of observing needed precaution .It should determine accident potential or causation, situational considerations such as the hazard level of the job and daily personal problems seem to be more important in determine accident risk. This is to say that individuals are at greater or lesser risk at different time in their working careers due to this situational consideration.

Therefore, this work is designed to appraise occupational safety in welding and fabrication workshop in Niger State.

**Statement of the problem**

This study describe or show that occupational hazard which leads to different levels of disability and fatal event disturbing source of loss to the price value of human life and also in the business aspect. Apart from pain and suffering which accident induces on an individual, it causes loss in economic and social activities, poor working condition of any type have the potential to affect a worker's health and safety. Unhealthy or unsafe working conditions are not limited factories – they can be found anywhere, whether the workshop is

indoors or outdoors. For many workers, such as agricultural workers or miners, the workshop is outdoors and can pose many health and safety hazards. Poor working condition can also affect the environment workers live in, since the working and living environment are the same for many workers. This means that occupational hazard can have harmful effects on workers, their families, and other people in community.

Aronseyin (2008) lamented that death and injury keep people out of life and work permanently and temperately as the case may be consequently, the vital contribute of these group of victims to economy in terms of output is lost. He further stated that apart from the output forgone, the economy suffers from replacement cost, which include medical treatment of accident victims replacement of the damaged equipment, man have loss and compensation claim. The cost of rehabilitating the injured, paying compensation and replacing damaged materials and in fracture constitute another area of concern which spells the difference between staying in business and going bankrupt. In a nut shell, high level of accident jeopardize the image of an organization sequel to this. This study was designed to find out the unsafe attitude or acts and conditions in the workshop which are potential threats to the members of welding and fabrication association in Niger state with a view to proffering solution to the menace of increasing lose of her skilled manpower through death and disability.

**Purpose of the study**

The main purpose of this study is to appraise occupational safety in welding and fabrication workshop in Niger state.

This study will find out:

-Adequate observation of the safety rules for welding and fabrication by welders in Niger state.

- Ways to promote safety practices in welding and fabrication workshops in Niger state.
- Competence of master trainers in the use of welding equipment.

**Significance of the study**

This study will be of benefits to the road- side welders and fabricators because work plays a central role in our lives, since most workers spend at least eight hours a day in the workplace, whether it is on plant station, in an office, factory etc. it also identify the solving method of safeguarding the workers. This study will equally be of benefit to the management because it would employ prevention of damage to equipment, loss of production time, compensation claims, loss of skilled manpower through death or incapacitation. Above all, the study will greatly enhance the corporate image of welders and fabricators if the results are fully implemented.

**Scope of the study**

The study was delimited to the appraisal of occupational safety in welding and fabrication workshop in Niger State . the study is limited to safety as it applies to the welders, fabricators and the practice which involve folding of plate, bending of plate and welding equipment and many not generalized to the masters trainers and trainees in the workshop.

**Research Question**

The following research question guided the study :

- How adequate are the safety rules for welding and fabrication been observed by welders in Niger state.?

- What are the ways to promote safety practices in welding and fabrication workshop in Niger state.?
- How competent are the master trainers in the use of welding equipments.?

**Hypotheses**

The following hypotheses are formulated to guide the study:

- There will be no significant different between the mean responses of the master trainers and the trainees with regards to adequate observation of safety rules for welders in Niger State.
- There shall be no significant different between the mean responses of the master trainers and the trainees with regards to ways of promoting safety practices in welding and fabrication workshops in Niger state.

# CHAPTER II

## REVIEW OF RELATED LITERATURE

This chapter present a review of literature that is relevant to the study, the review will be carried out under the following sub – headings.

1. The concept of safety
2. Occupational safety
3. Safety practices in fabrication and welding
4. Summary of review of related literature

### The concept of safety

Safety is the state of being safe from danger of accident, injury, serious physical harm or some other form of injury. Safety can also be define as the state of being safe from the condition of being protected against physical, social, spiritual, financial, political, emotional, occupational, psychological, educational or other types or consequences of failure, damage or any other event which could be considered non – desirable. Okorie (2002) maintained that safety could be observed to be the condition of being free from harm and accident in any daily activities involving human being at work. It is equally important that all reasonable worker or human being at work should always place priorities on safety before performing any function or duties which could be termed as (SAFETY FIRST). This idea is applicable in some companies like power holding company of Nigeria (PHCN) and some organization but still need to be practiced by each welding and fabrication workshop or working environment.

International Labour Organization (ILO) shows that an estimated 337 million workplace accidents and 2.3 million deaths occur every year across the globe as a result of occupational injuries and work – related disease. Oke (2002) such record could not be true of workers training from the beginning of his shop career in the industries. The acquisition and retention of safe habits of working should be encouraged by providing the necessary kits which is necessary for the activities by the master trainers. Apart from the effort on the workshop production and operating costs when injuries occur, both the trainees and the master trainer feel very concerned about the injured, particularly if the accident could have been prevented. Pun, yam and Lewis (2003) observed that duty of reasonable care, unacceptability of putting health and safety of people at risk, society's attitude to moral obligation, making the moral case to senior management, the preventive and compensatory effects of law, direct and indirect costs associated with incidents and/or unhealthy workplaces and their impact on the organization (include insured and un- insured costs) could be the reasons of safety.

**Occupational safety**

According to web dictionary: safety is the state of being certain that adverse effect will not be cause by some agent under define condition. According to advanced learners dictionary, safety is the state of being safe and protected from danger or harm. Safety is the state of being safe from the condition of being protected against physical, social, spiritual, financial, political, emotional, occupational, psychological, educational or other types or consequences of failure, damage or any other event which could be considered non-desirable. It is a state in which everybody within the workshop would want to maintain at any time. hence, we apply certain rules and precautions in the technology education workshop environments from the forgoing definition, safety is essentially the condition of being free from danger of accident,

injury or some form of harm. Occupational on the other hand, is the principal activity that people engage in so as to earn money or make a living.

The protection of worker against sickness, disease and injury related to work environment labour organization since 1919 when three of six recommendations directly related to occupational safety and health (OHS) were adopted. ILO (2005) concerns have been exposed that the globalization of the economic may exacerbate some of the factors contributing to casualties and ill- health at work.

According to ILO (2005), factors such as acceleration and liberalization of world trade and the spread of new technology, are generating type of work organization and thereby new patterns of exposure to the risks of occupational accidents and diseases.

ILO and WHO (1995) occupational safety aim at the promotion and maintenance of the highest degree of physical, mental and social well being of workers in all occupation, the prevention amongst workers of departures from health caused by their working condition, the protection of workers in their employment from risks resulting from factors adverse to health, the placing and maintenance of the worker in an occupational environment adapted to his psychological capabilities and to summarize the adaptation of work to man and each man to his job.

Originally, the main thrust of the ILO was improved what is considered as appalling. Lack of physical protection against the most dangerous occupation hazards. Lewis (2003) observed that occupational health and safety management system operates on the basis of policy, planning, implementation and operation, check and corrective action, management review, and continual improvement.

Occupational safety and health was changed with the enormous reasonability of ensuring health and safety of lives and property in the authority. By this circular, the rules of the government, the master trainers and trainees in ensuring safety in workplace were identified as follow:

- Roles of the government in maintaining safety in work environment.
- Roles of the master trainer in maintaining safety in welding and fabrication workshops.
- Roles of trainees in maintaining safety in the workshop

In addition to the safety rules that could be observed in any work environment government agencies are changed with the responsibility of ensuring that the work environment has a high standard of ergonomics. The agencies ensures that the observance of the relevant safety rules are mandatory effected. Some of the bodies which are statutorily empowered to enforce safety culture in work environment include federal environmental protection agency (FEPA) the agency is to maintain rules of the government which are:

1 Making legislation concerning occupational health and safety.

2 Investigating of reported cases of occupational accident and diseases.

3 Preparation of the code of practice and guidelines on safety and health various operational.

4 Provision of technical advice on occupational health and safety.

5 Co-operation with various nations and international organization and environment.

6 Enforcement of the legislation.

7 Prosecution of defaulting employers who contravene the factors and other subsidiary legislation.

8 Health and general education of the general public.

Roles of master trainer in maintaining safety in welding and fabrication workshop is the responsibility of the management as employer in a work environment to provide safe working condition in order to avoid loss of life, materials and equipment. Pun and Lewis (2003) in their own contribution listed the responsibility of management as follows:

1 Systematic evaluations of the working environment.

2 Endorsing preventative measures which eliminate reasons for illness in the workplace.

3 Giving information in the subject of employees health

4 Giving information on occupational hygiene, ergonomics and also environmental and safety risk in the workplace.

5 Consulting room on the work environment for the workers.

6 Voluntary medical examinations.

7 Health check assessments (if needed for the job concerned)

**Roles of trainees to maintain safety in the workshop**

According to St lucia (2001) the employer bears the responsibility for his/her own safety. These responsibilities are:

1 Take reasonable care of his/her safety and health at all times and also that of any other persons who may be affected by his/her acts or omissions at work.

2 Co-operate with his/her employer in carrying out all duties and requirements imposed by this act.

3 Not deliberately misuse or interfere with the operation of any safety device or other appliance provided for his/her protection or that of others.

4 Ensure, so far as is within his/her control, that risks to himself or herself to others and to the environment do not arise as a result of the handlings, storage, transport, use and disposal of dangerous substances.

5 Make proper use and take care of personal clothing and any other equipment provided for his/her own protection.

6 Report immediately to his/her immediate superior any defect which he/she may discover and which, in his/her own opinion, may be a cause of accident or of injury to health.

7 Report immediately to his/her immediate superior any accident or injury to health that he/she has suffered.

From the forgoing, it is evident that a successful health and safety practice is neither the exclusive of the master trainers nor that of nor that of the trainees. Rather, it requires the collaboration and participation of both parties. Unfortunately, some employers assume brittle or no responsibility for the protection of workers health and safety. According to akuegwu (2005)without a good socio- psychological, physical and intellectual environment, the trainees and trainers will not perform well in their operation carrying out in the workshop. A good working place always brings out or carry an effective operations in the workshop. Burton j. (2004) asserted that to safeguard one's existence that means to have a fixed and reliable income.

That is extremely important and it doesn't depend on the level of income. the point is to have security in the job.

Occupational hazard and risk are recognized to the more widespread in small and medium scale enterprises (SMES) then in large enterprises. According to ILO (2005) SMES have limited awareness of the existence of occupational safety and health standards, or how to comply with them without undermining business performance. There is a reluctance to seek advice associated with inspection in developing countries most SMES.

21$^{ST}$ October 2001 annual reported on welder association in Minna, Niger State chapter under the leadership of Mr Ezechukwu victor shows the several workshop and enlightenment program on safety have been organized for trainees in welding and fabrication workshop.

A workshop on accident prevention and similar workshops was organized in four districts in Niger state which include Zungeru, Suleja, Bida and Kotangora. The aim of the workshop was to appraise and average the application of safety rules by workmen, so as to reduce accident to the bearest minimum and also aimed at promoting a high degree of physical, mental and social well being of the worker. According to national association of workers in Niger State NWANS (2002) accident prevention cost less in real terms in the long run.

**Welding and fabrication**

Welding is a fabrication or sculptural process that joins materials, usually metals or thermoplastic by causing coalescence. Annon (1973) welding is a process of permanent joining two materials (usually metals) through localized coalescence resulting from a suitable combination of temperature, pressure and metallurgical condition. welding and fabrication is basically a joining of two or more metals to produce or come out with something good. Ideally, a

weld should achieve a complete continuity between the parts being joined such that the joint is indistinguishable from the metal in which the joint is made. Denary (1996) observed that 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. Brown (1974) maintained that quality of welding and fabrication depends on the following parameters such as skill of welder, welding parameters, shielding medium, working environment, work layout, fit up and alignment, protection from wild winds during on site welding, correct processes and procedures and suitable distortion control procedures in place. Amson and salter (1966) stated that welding is used as a fabrication process in every industry large or small that is a principal means of fabricating and repairing metal products. A welder or fabricator should learn to read engineering drawings, use geometric development methods and metal forming techniques, knowing how to use computers in making metal product and have a comprehensive knowledge of a range of industrial welding and joining processes to manufacture the required items. Billey (1971) a welder or fabricator has to be able to interpret engineering drawing and then accurately cut steel plates into required shapes and again, they must then weld them into the structure according to the drawings.

In carrying out a welding process in the workshop, the welder must be able to take care of himself so that he will not acquire any dangerous act in the workshop. Wood (1976) lamented that hazard in welding depends on the welding method, what the welding rod is made of, filler metals and base metals (such as mild steel and stainless steel), paints and other coatings on the metals being welded.

**Safety practices in welding and fabrication**

Safety is the state of being safe from danger and accident, injury , serious physical harm or some other forms of injury. It is a state which everybody within the workshop would want to maintain at anytime. According to ojo (1994) observed that safety practices or taking precautionary safety measures in the process many lost their lives, some are partially or permanently impaired machines, tools and equipment are at time not spared. He stressed further that the problem of accident is compounded by flagrant in difference to safety rules and regulation by industrial workers and student like obedience is better than sacrifice many accidents in the workshop, industries conduct probably have been preventing stated safety precautions.

Practicing safety in welding and fabrication workshop, there must be rules or certain rules and regulations that must be taken in the workshop environment. Here, however, an attention will be mainly on those safety precautions regarding welding and fabrication in the workshop, rules and regulation are codes of conduct to avoid injury and damage buttressing this view. Oswald, Willard and victor (1975) recognized workshop rule and regulation as safety precaution that govern the conduct of master trainer in welding and fabrication workshop in order to avoid accidents and personal injury.

For an accident free working environment, rules and regulations are prepared to control safe work practices and work habits of people expectably when they have to handle or work with machine requirements, tools and material. According to St lucia (2001) listed some safety practices that should be taken when working in the workshop.

1. Take reasonable care of his/her safety and health at all times and also that of any other persons who may be affected by his/her acts or omission at work.
2. Co-operate with his/her employer in carrying out all duties and requirements imposed by this act.
3. Not deliberately misuse or interfere with the operation of any safety device or other appliance provided for his/her protection of that of others.
4. Ensure, so far is within his/her control, that risks to himself or herself to others and to the environment do not arise as a results of the handlings, storage, transport, use and disposal of dangerous substances.
5. Make proper use and take care of personal clothing and any other equipment provided for his/her own protection.
6. Report immediately to his/her immediate superior any defect which he/she may discover and which in his/her own opinion may be a cause of accident or of injury to health.
7. Report immediately to his/her immediate superior any accident or injury to health that he/she has suffered.

**Summary of the related literature reviewed**

This chapter presents a review of literature that is relevant to the study. Appraisal of occupational health/safety practices in welding and fabrication workshop in Niger state from its inception till date the major activities in the welding and fabrication workshop is to give rise to the outgoing transformation and unbundling of the efforts aimed at annual report head on 21$^{ST}$ October 2001 is to ensure a high standard of ergonomic trainees at both local and international levels were x-rayed.in the literature, it is indicated that various government agencies and local welders include welders and fabricators in Niger state have demonstrated appreciable interest in

the fight against the appealing loss of lives and properties through occupational accident. The tripartite responsibilities of the government, master trainers and trainees respectively in ensuring highest degree of physical, mental and social well being of worker in their occupation were identified in the review.

Unfortunately, an effort at preventing occupational accidents has not yielded much. Occupational accidents and diseases still remain the most appealing human tragedy of the modern industry and one of its forms of economic waste. In view of the forgoing, the researcher taught that there cannot be a better time now to undertake a study of this nature which is aimed at exploring possible ways high cost of rehabilitating injured workers, thereby enabling the welders and fabricators to throw her weight towards a better and improve service delivery to the people.

# CHAPTER III

# METHODOLOGY

This chapter deals with the description of the procedure and steps taken in the course of study. The steps include area of the study, population, sample, instruments and administration of the instrument , method of data analysis and decision rule.

## Research Design

A descriptive survey design was used in this study as it involves the use of questionnaire to elicit opinions and response of master trainers and trainees on the issue of occupational safety practice in welding and fabrication workshop in Niger state.

## Area Of The Study

The study will be conducted in five (5) towns in Niger state where activities of road sides welders are paramount, those towns include Minna, Bida, Suleja, Mokwa, and Kotangora all of which are local government headquarters in Niger state.

## Population

The target population of the study consist of all master trainers and trainees in the welding out fit located in the five (5) towns which serves as the area of the study.

## Sample

A simple random sampling techniques was used to select five (5) master trainers and ten (10)trainees each from the five (5) towns identified in the area of the study. Therefore sample of

# CHAPTER IV

# PRESENTATION AND DATA ANALYSIS

This chapter deals with the presentation and analysis of data with respect to the research questions formulated for this study, the result of this data analysis for the research questions are presented as follows.

## Research Question 1

How adequate are the safety rules for welding and fabrication been observed by welders in Niger state.

**Table 1 :** ***Mean responses of master trainer and trainees on how adequate the safety rules for welding and fabrication has been observed by welders in Niger state.***

$N_1$=25, $N_2$=50

| S/N | ITEMS | $X_1$ | $X_2$ | $X_t$ | Remarks |
|---|---|---|---|---|---|
| 1 | Light are always on inside the workshop | 2.52 | 2.42 | 2.47 | Inadequate |
| 2 | Machines are always operated by the operators | 2.04 | 1.74 | 1.89 | Inadequate |
| 3 | Every workers always switch off their phones when work is on | 2.84 | 2.96 | 2.90 | Adequate |
| 4 | Workers always concentrate on their works inside the workshop | 2.92 | 2.98 | 2.95 | Adequate |
| 5 | Workshop are always kept clean after work | 2.40 | 2.32 | 2.36 | Inadequate |
| 6 | Adequate working space and means of access, free from danger, is provided for all apparatus that has to be worked or attended to by any person. | 3.36 | 3.36 | 3.36 | Adequate |
| 7 | Workshops are adequately ventilated | 2.76 | 1.48 | 2.12 | Inadequate |
| 8 | All the tools and machines are kept clean after work | 3.20 | 3.26 | 3.23 | Adequate |
| 9 | Horse play are not always in the workshop | 2.84 | 2.58 | 2.71 | Adequate |
| 10 | The workshop are always locked after work | 1.92 | 2.04 | 1.98 | Inadequate |

**Key**

**N1 =** Numbers of master trainer,

**N2=** Numbers of trainees.

X = Mean of master trainer,

X2 = Mean of trainees.

Xt = Average mean of master trainer and trainees.

The table above shows the responses of the two group respondents used for the study. Items with mean score ranging between 2.71- 3.36 are adequate while item with mean score of 1.89- 2.47 are inadequate. From this, item 3,4,6,8 and 9 are adequate while item 1,2,5,7 and 10 are inadequate.

## Research Question 2.

What are the ways to promote safety practices in welding and fabrication workshop in Niger state?

**Table 2:** ***the mean responses of master trainer and trainees on Ways to promote occupational safety practices in welding and fabrication workshop in Niger state.***

| S/N | ITEMS | $X_1$ | $X_2$ | $X_t$ | Remarks |
|---|---|---|---|---|---|
| 11 | Maintenance culture for equipment and machine should be encourage | 3.00 | 2.90 | 2.95 | Agree |
| 12 | Workmen should be prohibited from making and receiving call while working | 3.40 | 3.48 | 3.44 | Agree |
| 13 | Conduction of relevant test on the machine, equipment and tools be practiced. | 3.24 | 3.22 | 3.23 | Agree |
| 14 | Organizing seminars and workshops on safety regulations for workers | 3.28 | 3.28 | 3.28 | Agree |
| 15 | Legislation of appropriate laws on safety at work by government | 1.92 | 1.88 | 1.90 | Disagree |
| 16 | Master trainers should enforce strict compliance with rules and regulation | 2.40 | 1.78 | 2.09 | Disagree |

| | | | | | |
|---|---|---|---|---|---|
| 17 | Organizing a mandatory induction training on safety for every trainee | 3.40 | 3.44 | 3.42 | Agree |
| 18 | Health and safety day should be declared in the workshop annually to create safety consciousness among the worker | 3.20 | 3.18 | 3.19 | Agree |
| 19 | Prohibiting inexperience workmen from working near equipment involving very high voltage | 2.16 | 2.46 | 2.31 | Disagree |
| 20 | Reporting and documenting accident whether minor and major for future seminar | 2.52 | 2.60 | 2.56 | Agree |
| 21 | Provision of protective equipment such as safety hats, shop and hand gloves for trainee | 3.16 | 3.12 | 3.14 | Agree |
| 22 | Regular training of workers on current safety practice as obtained in industries | 2.96 | 2.98 | 2.97 | Agree |
| 23 | Special clothing should be worn that will perfectly resist spark and hot slag | 3.24 | 3.24 | 3.24 | Agree |
| 24 | Occupational health and safety development should be established in every district whether welding activities are in-existence | 3.04 | 3.06 | 3.05 | Agree |
| 25 | Reward staff annually on the basis of observing safe work habit | 3.20 | 3.28 | 3.24 | Agree |
| 26 | Drawing instruction and rules of conduct in the workshop | 3.56 | 3.20 | 3.38 | Agree |
| 27 | Provision of adequate lighting and ventilation in welding and fabrication workshop | 3.40 | 3.62 | 3.51 | Agree |

The data presented in Table 2 revealed that the respondents agree with all the items with mean score ranging from 2.56 – 3.81 except 15, 16 and 19 with mean score ranging from 1.90-2.31.

## Research Question 3

How competent are the master trainers in the use of welding equipment.

**Table 3:** ***Mean Responses of Master Trainer and Trainees on how Competent are the Master trainers in the use of Welding Equipment.***

| S/N | ITEMS | $X_1$ | $X_2$ | $X_t$ | Remarks |
|---|---|---|---|---|---|
| 28 | Fire extinguisher | 2.64 | 2.54 | 2.59 | Competent |
| 29 | Respirator | 2.08 | 2.10 | 2.09 | Incompetent |
| 30 | Fume extractor | 1.96 | 2.16 | 2.06 | Incompetent |

| | | | | | |
|---|---|---|---|---|---|
| 31 | Safety boots/foot wears | 3.08 | 3.28 | 3.18 | Competent |
| 32 | Hand gloves | 3.44 | 3.32 | 3.38 | Competent |
| 33 | Helmet/safety hats | 3.08 | 3.26 | 3.17 | Competent |
| 34 | Eye protector/goggle/shield | 3.32 | 3.26 | 3.29 | Competent |
| 35 | First aid box | 3.12 | 3.22 | 3.17 | Competent |
| 36 | Fault alarm | 2.60 | 2.82 | 2.71 | Competent |
| 37 | Cylinder safety valves | 2.96 | 3.20 | 3.08 | Competent |

The data presented in Table 3 revealed that the respondents competent with all the items with mean score ranging between 2.59-3.38 and incompetent with the items 29 and 30 with mean score of 2.06 and 2.09 respectively.

## Hypothesis one

$H_{O1}$ There is no significant differences in the mean rating of master trainer and trainees regarding how adequate the safety rules for welding and fabrication has been observed and in Niger state.

**Table 4:** ***t- test analysis of master trainer and trainees regarding how adequate the rules for welding and fabrication has been observed by welders in Niger state.***

$N_1$= 25, $N_2$= 50

| S/N | ITEMS | $X_1$ | $SD_1$ | $X_2$ | $SD_2$ | T-cal | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | Approved protective wears are always worn by all workmen | 2.52 | 1.14 | 2.42 | 1.23 | 0.35 | NS |
| 2 | All the machines in the workshop are with safety devices | 2.04 | 1.04 | 1.74 | 1.04 | 1.18 | NS |
| 3 | There are functional fire extinguisher located in strategic position in the workshop | 2.84 | 1.05 | 2.96 | 1.04 | -0.47 | NS |
| 4 | Caution/prohibition tags are displayed on | 2.92 | 1.02 | 2.98 | 1.19 | -0.23 | NS |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | equipment that must be operated | | | | | | |
| 5 | There are proper emergency exit in the workshop | 2.40 | 1.23 | 2.32 | 0.93 | 0.29 | NS |
| 6 | Slogans and poster on safety are displayed on specific sections of the workshop | 3.36 | 0.74 | 3.36 | 0.91 | 0.00 | NS |
| 7 | Every worker is provided with protective hand gloves, safety boots and hat | 2.76 | 1.07 | 1.48 | 0.88 | 5.17 | S |
| 8 | Compartment such as working rooms are adequately lighted | 3.20 | 0.89 | 3.26 | 0.98 | -0.27 | NS |
| 9 | Workshop are adequately ventilated | 2.84 | 1.22 | 2.58 | 1.06 | 0.91 | NS |
| 10 | The fire extinguisher are routinely serviced and displayed unobstructed | 1.92 | 0.89 | 2.04 | 1.08 | -0.51 | NS |

**Keys**

N1 = Numbers of Master trainer,
N2 = Numbers of Trainees.
S.D1= standard deviation of Master trainer,
S.D2 = standard deviation of Trainees.
t= t-test value of Master trainer and Trainees.
S= Significant.
NS= Not significant.

The analysis in table 4: showed that the t-cal values of all the 10 items were below the t-cal value except for item 7. Therefore, the null hypothesis was accepted for each of the 9 items. This implies that there is no significant difference for the items accepted in the mean ratings of master trainer and trainees regarding adequacy of safety rules for welding and fabrication been observed by welders in Niger state.

## Hypothesis two

$H_{02}$ There is no significant differences between the mean ratings of master trainers and the trainees with regards to ways of safety practices in welding and fabrication workshop in Niger state.

**Table 5:** ***t- test analysis of master trainer and trainees regarding ways of promoting safety practice in welding and fabrication workshop in Niger state.***

$N_1 = 25, N_2 = 50$

| S/N | ITEMS | $X_1$ | $SD_1$ | $X_2$ | $SD_2$ | T-cal | Remarks |
|---|---|---|---|---|---|---|---|
| 11 | Maintenance culture for equipment and machine should be encourage | 3.00 | 1.02 | 2.90 | 1.04 | 0.40 | NS |
| 12 | Workmen should be prohibited from making and receiving call while working | 3.40 | 0.69 | 3.48 | 0.83 | -0.44 | NS |
| 13 | Conduction of relevant test on the machine, equipment and tools be practiced. | 3.24 | 0.81 | 3.22 | 0.94 | 0.10 | NS |
| 14 | Organizing seminars and workshops on safety regulations for workers | 3.28 | 0.83 | 3.28 | 0.94 | 0.00 | NS |
| 15 | Legislation of appropriate laws on safety at work by government | 1.92 | 1.09 | 1.88 | 0.86 | 0.16 | NS |
| 16 | Master trainers should enforce strict compliance with rules and regulation | 2.40 | 1.10 | 1.78 | 0.86 | 2.47 | S |
| 17 | Organizing a mandatory induction training on safety for every trainee | 3.40 | 0.75 | 3.44 | 0.75 | -0.22 | NS |
| 18 | Health and safety day should be declared in the workshop annually to create safety consciousness among the worker | 3.20 | 0.94 | 3.18 | 0.97 | 0.09 | NS |
| 19 | Prohibiting inexperience workmen from working near equipment involving very high voltage | 2.16 | 1.12 | 2.46 | 1.25 | -1.05 | NS |
| 20 | Reporting and documenting accident whether minor and major for future seminar | 2.52 | 1.02 | 2.60 | 0.92 | -0.33 | NS |
| 21 | Provision of protective equipment such as safety hats, shop and hand gloves for trainee | 3.16 | 0.78 | 3.12 | 0.97 | 0.19 | NS |
| 22 | Regular training of workers on current safety practice as obtained in industries | 2.96 | 0.96 | 2.98 | 1.03 | -0.08 | NS |
| 23 | Special clothing should be worn that will perfectly resist spark and hot slag | 3.24 | 0.86 | 3.24 | 0.88 | 0.00 | NS |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 24 | Occupational health and safety development should be established in every district whether welding activities are in-existence | 3.04 | 0.96 | 3.06 | 0.97 | -0.08 | NS |
| 25 | Reward staff annually on the basis of observing safe work habit | 3.20 | 0.98 | 3.28 | 0.92 | -0.34 | NS |
| 26 | Drawing instruction and rules of conduct in the workshop | 3.56 | 0.80 | 3.20 | 1.02 | 1.67 | NS |
| 27 | Provision of adequate lighting and ventilation in welding and fabrication workshop | 3.40 | 0.85 | 3.62 | 0.69 | -1.12 | NS |

The analysis in table 5 showed that the t-cal values of 16 items were below the t-cal except items 16 while item 11,12,13,14,15,17,18,19,20,21,22,23,24,25,26 and 27 were needed indicating that there is no difference between the respondents hence the opinion of the respondents in item 16 is different from the remaining item in relation to ways to promote safety practices in welding and fabrication workshop in Niger state.

**Findings**

Based on the data collected and analyzed, the following findings were made according to the research questions raised for the study

Finding related to how adequate the safety rules for welding and fabrication been observed by welders in Niger state.

1. Every workers always switched off their phones when work is on.
2. Workers always concentrate on their work inside the workshop.
3. All the machines are always kept clean after work.
4. Workshop are always clean after work
5. Workshop are adequately ventilated

Finding related to ways of promote safety practices in welding and fabrication workshop in Niger state.

1. Maintenance culture for equipment and machine should be encourage.
2. Workmen should be prohibited from making and receiving call while working.
3. Conduction of relevant test on the machine, equipment and tools be practiced.
4. Organizing seminars and workshops on safety regulations for workers.

   5. Safety day should be declared in the workshop annually to create safety consciousness among the worker.
5. Reporting and documenting accident whether minor and major for future seminar.
6. Provision of protective equipment such as safety hats, shop and hand gloves for trainee.

Finding related to how competent are the master trainers in the use of welding equipment.

1. Master trainers in the workshop knows how to use fire extinguisher very well.
2. Master trainers knows how and when to use helmet/safety hats
3. Master trainers knows the exact time to operate fault alarm in the workshop
4. They also know when and how to use eye protector/goggle/shield

**Discussion Of The Findings**

The discussion of the findings are based on the research questions raised for the study.

The findings from table 1 indicate that workers always concentrate on their work inside workshop machines. This is in line with Oswald, Willard & victor (1975) recognized workshop rule and regulation as safety precaution that govern the conduct of master trainer in welding and fabrication workshop in order to avoid accidents and personal injury. Ojo (1994) also observed

that safety practices or taking precautionary safety measures in the process many lost their lives, some are partially or permanently impaired machines, tools and equipment are at time not spared. He stressed further that the problem of accident is compounded by flagrant in difference to safety rules and regulation by industrial workers and student like obedience is better than sacrifice many accidents in the workshop, industries conduct probably have been preventing stated safety precautions. Practicing safety in welding and fabrication workshop, there must be rules or certain rules and regulations that must be taken in the workshop environment. Here, however, an attention will be mainly on those safety precautions regarding welding and fabrication in the workshop, rules and regulation are codes of conduct to avoid injury and damage

The findings revealed that all the machines are kept clean after work. This is in line with Lewis (2003) observed that occupational health and safety management system operates on the basis of policy, planning, implementation and operation, check and corrective action, management review, and continual improvement. ILO (2005) who stated that SMES have limited awareness of the existence of occupational safety and health standards, or how to comply with them without undermining business performance. There is a reluctance to seek advice associated with inspection in developing countries most SMES.

The findings revealed that compartment such as working rooms are adequately lighted and Workshop are adequately ventilated. This was supported by Pun and Lewis (2003) in their own contribution listed the responsibility of management as follows:

8 Systematic evaluations of the working environment.

9 Endorsing preventative measures which eliminate reasons for illness in the workplace.

10 Giving information in the subject of employees health

11 Giving information on occupational hygiene, ergonomics and also environmental and safety risk in the workplace.

12 Consulting room on the work environment for the workers.

13 Voluntary medical examinations.

14 Health check assessments (if needed for the job concerned)

The finding from table 2 indicate that maintenance culture for equipment and machine should be encourage. This was supported by ILO and WHO (1995) occupational safety aim at the promotion and maintenance of the highest degree of physical, mental and social well being of workers in all occupation, the prevention amongst workers of departures from health caused by their working condition, the protection of workers in their employment from risks resulting from factors adverse to health, the placing and maintenance of the worker in an occupational environment adapted to his psychological capabilities and to summarize the adaptation of work to man and each man to his job.

The findings revealed that conduction of relevant test on the machine, equipment and tools be practiced. This is in line with Okorie (2002) who maintained that safety could be observed to be the condition of being free from harm and accident in any daily activities involving human being at work. It is equally important that all reasonable worker or human being at work should always place priorities on safety before performing any function or duties which could be termed as (SAFETY FIRST). This idea is applicable in some companies like power holding company of Nigeria (PHCN) and some organization but still need to be practiced by each welding and fabrication workshop or working environment.

The findings also reveal that workmen should be prohibited from making and receiving call while working. This is line with St lucia (2001) who stated that employer bears the responsibility for his/her own safety. These responsibilities are:

8 Take reasonable care of his/her safety and health at all times and also that of any other persons who may be affected by his/her acts or omissions at work.

9 Co-operate with his/her employer in carrying out all duties and requirements imposed by this act.

10 Not deliberately misuse or interfere with the operation of any safety device or other appliance provided for his/her protection or that of others.

11 Ensure, so far as is within his/her control, that risks to himself or herself to others and to the environment do not arise as a result of the handlings, storage, transport, use and disposal of dangerous substances.

12 Make proper use and take care of personal clothing and any other equipment provided for his/her own protection.

13 Report immediately to his/her immediate superior any defect which he/she may discover and which, in his/her own opinion, may be a cause of accident or of injury to health.

14 Report immediately to his/her immediate superior any accident or injury to health that he/she has suffered.

This also reveal that reporting and documenting accident whether minor and major for future seminar. This was in line with International Labour Organization (ILO) shows that an estimated 337 million workplace accidents and 2.3 million deaths occur every year across the globe as a result of occupational injuries and work – related disease. Oke (2002) such record could not be true of workers training from the beginning of his shop career in the industries. The acquisition

and retention of safe habits of working should be encouraged by providing the necessary kits which is necessary for the activities by the master trainers. Apart from the effort on the workshop production and operating costs when injuries occur, both the trainees and the master trainer feel very concerned about the injured, particularly if the accident could have been prevented.

Findings from table 3 of the study confirm that Safety boots/foot wears, First aid box and Hamlets/safety. This is in line with Brown (1974) maintained that quality of welding and fabrication depends on the following parameters such as skill of welder, welding parameters, shielding medium, working environment, work layout, fit up and alignment, protection from wild winds during on site welding, correct processes and procedures and suitable distortion control procedures in place.

The study also reveals that first aid box and Eye protector/goggle/shield. This is in line with Pun, Yam & Lewis (2003) who observed that duty of reasonable care, unacceptability of putting health and safety of people at risk, society's attitude to moral obligation, making the moral case to senior management, the preventive and compensatory effects of law, direct and indirect costs associated with incidents and/or unhealthy workplaces and their impact on the organization (include insured and un- insured costs) could be the reasons of safety. Akuegwu (2005) also pointed out that without a good socio- psychological, physical and intellectual environment, the trainees and trainers will not perform well in their operation carrying out in the workshop. A good working place always brings out or carry an effective operations in the workshop.

# CHAPTER V

# SUMMARY, CONCLUSION AND RECOMMENDATION

## Summary of the study

The study was conducted to assess the current status of occupation safety in welding and fabrication workshop. The aim of this study was to identify possible methods and strategies for promoting occupational safely in welding and fabrication workers place.

The statement of problem, purpose significance, scope assumption of the study research question and hypothesis were all stated, tested and discussed appropriately in line with the topic. The review of welding related literature presented a over view of welding and fabrication workshop in Niger state. The major occupational health and safety activities by ILO to word ensuring a health and safety work environment were reviewed.

The instrument used for data collection was the questionnaire. The questionnaire was administered by the researcher personally to a total population zones in Niger state. This consisted of 25 master trainers and 50 trainees. In analyzing the data collected, the researcher made use of mean statistic, standard deviation and t-test determine the degree of agreement or disagreement, and acceptance or rejection as the case may be.

Base on the findings, it was recommended that all workmen should have helmet/safety hat in the workshop, first aid should be placed in the entire workshop, maintenance culture for equipment and machine should be encouraged, conduction of relevant test on the machine equipment and tools be practiced, provision of protective equipments such as safety hats, hand gloves for trainee.

**Implication of the study**

From the results of data analysis, interpretation and discussion, some pertinent implications for workers involve in fabricating and welding.

The study provide useful information about how rules for welding and fabrication are effectively used. The study has unveiled several ways of promoting occupational health and safety standard in welding and fabrication workshop. The study also pin point the absent of some important personal protective equipment and facilities in welding and fabrication workshop. If these findings are sincerely accepted and actively implemented by the master trainers, it would imply prevention of loss of skilled manpower through death or incapacitation, prevention of damages to equipment and materials, and the burden of compensation claims.

**Conclusion**

From the foregoing, it can be concluded that several rules for welding and fabrication are adequately observe and effectively use. It is also concluded that several ways of promoting occupational health and safety practices in welding and fabrication workshop are numerous and if utilized will minimize accident in welding and fabrication workshop.

Finally, it is concluded that master trainers are competent in the use of welding equipment.

**Recommendations**

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

1 Caution/prohibition tags should be displayed on equipment that must be operated.

2 All workmen should have helmet/safety hat in the workshop.

3 Approved protective wears should worn by all workmen in welding and fabrication workshop

4 First aid box should be place in the entire workshop.

5 All workmen should follow the rules guiding welding and fabrication in the workshop.

**Suggestion for further research**

I. Evaluation of safety devices and equipment in technical colleges workshops in Niger state.

II. Assessment of safe work habit of workshop assistance in technical colleges in Niger state and FCT Abuja.

III. Appraisal of maintenances cultures of teachers in Government Technical Colleges in Niger state.

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