UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

A STUDY INTO SAFETY OBSERVANCE OF APPRENTICES IN WELDING AND FABRICATION UNDER THE INFORMAL SECTOR AT KUKURANTUMI IN THE NEW JUABENG MUNICIPALITY

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TANG BERNARDUS

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A Dissertation in the Department of MECHANICAL TECHNOLOGY EDUCATION, Faculty of TECHNICAL EDUCATION, Submitted to the School of Graduate Studies, University of Education, Winneba in partial fulfillment of the requirements for the award of a Master of Technology (Mechanical) degree.

AUGUST, 2017

DECLARATION

STUDENT'S DECLERATION

I, **Tang Bernardus**, declare that this Dissertation, with the exception of quotation and references contained in the published work have all been identified and duly acknowledge, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

SIGNATURE ……

DATE……..……..……..

SUPERVISOR'S DECLARATION

I hereby declare that the preparation and presentation of this work was supervised in accordance with the guidelines for supervision of Dissertation as laid down by the University of Education, Winneba.

NAME: **Engr. Stephen K. Amoakohene**

SIGNATURE: ……..…….....

DATE: …….…….....

DEDICATION

This piece of research work is dedicated to God Almighty, for his guidance and protection given to me during my studies.

I dedicated this work to my late brother and mother Sebastian Tang and Mrs. Jullitta Signye.

I love you so dearly. Thanks so much for your unlimited love for me, i really appreciated it.

ACKNOWLEDGEMENT

My profound gratitude and appreciation goes to God for granting me the Knowledge, Health, Protection and guidance with this research work.

I am very grateful to Engr. Stephen K. Amoakohene my Supervisor, a Senior Lecturer in Mechanical Department for his time, dedication and contribution he made towards the completion of this piece. In actual fact, i really enjoyed working under his supervision. May God richly bless him abundantly. Likewise i will take this opportunity to thank all the Staff at the Mechanical Department (UEW-K)

I would like to thank the S.V.D Provincial and his Council for their support and contribution they made toward my education at this University.

Many thanks to the entire S.V. D Community for their prayers and moral support. Finally, many thanks to my principal of St Paul Technical School and the Staff at Kukurantumi I say god blessing be with you all.

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ABSTRACT

This case study was conducted at Kukurantumi in the Eastern Region of Ghana. The population of the research involved the artisans (welders) comprising of workshop owner, master welder and the apprentices. In reference to the diagnostic test conducted, the analysis in chapter four showed relatively the poor observance of safety in the welding and fabrication in the workshops. The researcher used 60 people for the sample size and simple random sampling technique was employed. The study used questionnaire, interview and observation in collecting the data. The finding revealed that, there were carelessness on the part of the welders, workshop organization was poor and there was no compliance of regulation. Finally there were less attempted measures made to ensure safety for the workshop owners. In view of the above problems the researcher has recommended the following measures to ensure the observance of safety in the welding and fabrication workshop. The welders need to be mobilized into an association for training programmes to be organized for them on the need to observance of safety precaution in the work they do at various places. Workshop owners should ensure that proper and adequate logistics are provided for artisans to promote safety at the workshop and workplaces. In conclusion the researcher wish to say that proper care and maintenance practice should be promoted in the various welding workshops in order to prevent accidents occurring and also it is to ensure effectiveness and efficiency in the working areas of welders which will bring development in their works as well as the country Ghana.

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Welding is a fabrication or sculptural process that joins materials, usually metals or thermoplastics by causing coalescence (Allen, 2006). It can be defined as a process of joining similar materials or dissimilar materials. This is often done by melting the work pieces and adding a filler material to form a pool of molten material that cools to become a strong joint with pressure sometimes used in conjunction with heat or by itself to produce the weld. This is in contrast with soldering and brazing which involve melting a lower melting material between the work pieces to form a bond between them without melting the parent metal.

Garg (2005) states that there are different ways materials can be joined together. It includes a gas flame, an electric arc ultrasound and the forge welding. Often an industrial process welding can be done in many different environments including open air, under water and in an open space. Regardless of the location, however, welding remains dangerous and precaution should be taken to avoid burns and over exposure to ultraviolet light which are also referred to as arc rays.

Somsky (1986) states that, until the end of 19th century, the only welding process was forge welding. Blacksmiths used this process for centuries to join iron and steel by heating them above the upper critical point and hammering them together as one piece. Arc welding and oxy-fuel welding were among the first processes to be developed late in the century.

This welding technology advanced quickly during the early 20th century as World War I and World War II drove the demand for reliable and inexpensive joining methods. Following the wars, several modern welding techniques were developed including manual methods like shielded metal arc welding as one of the most popular welding methods, the semi-automatic and automatic processes such as gas metal arc welding (Cooper & Wood, 1997).

Ghana as a developing country, the welding industry could have been the sole sector, who can effectively and efficiently handle welding and fabrication industry to enhance the country economic growth.

The problem of safety precaution observance is thus a key factor in the welding industry. In recent times due to development in technology, there are numerous occasions when welders are involved in accidents sometimes resulting in the loss of lives, properties as well as injuries. In most cases, investigation shows that some welders could have prevented most of these accidents which occurs at working places.

Electrocution of welders is also another area that needs to be looked at. Some welders are killed due to wrong handling of tools and equipment, working without considering safety precaution as key factor to work permit. For example, it is reported that most injuries from electric shocks occur through accidental contact with an exposed wire or other parts of a live wire of electrical circuit such as welding cables and electrode holders.

American Welding Society (2006) reports that, about 600 welders died each year. Hence safety precaution in the welding industry cannot be over emphasized. The welding industry in Ghana as at now has no association, hence it has become a problem to

coordinate and control the activities and affairs of welders especially in the informal sector. It has therefore become necessary to organize Ghanaian welders into one entity for training.

Individuals open up workshops for welding just by acquiring land. The only thing left for them is to have electricity connected to the shop or they purchase two cylinders, oxygen and acetylene bottles and then the following day he/she is in serious business. Very often, incidents of fire outbreaks in welding shops are due to human errors and the effects of such have grievous consequences on the socio-economic development on the Ghanaian economy. Most of the accidents also involve welders who have no knowledge on safety rules and regulations pertaining to the trade of welding (Brumbuah, 2004).

1.2 Statement of the Problem

A good number of welding apprentices in the informal sector have no adequate knowledge of safety in welding. They lack basic skills in handling tools and equipment which are to be used in welding trade. It is sad to note that most of these welders after completing their apprenticeship do not have access to any further training.

This study is intended to analyze the safety observance of apprentices under the informal sector in the welding workshops at Kukurantumi in the New Juabeng Municipality of Ghana to come out with possible suggestions and solutions to observance of safety, in order to curb the problems of accidents which is mostly due to human error.

1.3 Purpose of the Study

The purpose of the study is to investigate into observance of safety in welding and fabrication under the informal sector at Kukurantumi in the New Juabeng Municipality. The ever increasing electrocution of welders and fire outbreaks in welding workshops, coupled with loss of property of welders and the Ghanaian public as a whole motivated the writer to choose this topic.

For many years now, the world has benefited a great deal of good items from the welding industries. Therefore, most Ghanaians are aware of the importance of the welding industry to the socio-economic development of the nation and to the individual Ghanaians. In this recent phase of our national development, Ghana as a whole needs all skilled welders and apprentices to know the importance of safety rules to enable them to use these skills to help developed our country Ghana.

As welding industries aim at productivity, it also involves some risks which when not emphasized; this would lead to loss of lives and properties. Hence certain basic principles in safety needs are necessary to be adhered to. These problems and other factors have compelled the writer to undertake this research to:

- Obtain information on the socio-economic background and the working environment of the welders and their apprentices.
- Determine how the socio-economic background influences the welders' attitude towards safety.
- Find out whether welding workshop owners take interest in their apprentice safety needs
- Find out the welders contribution to the safe working rules and regulations.

1.4 Research Questions

To help achieve a more comprehensive study, it is important to have questions to serve as a guide to arrive at a more decisive conclusion. The following are the research questions.

1. What are the strategies put in place on tools handling and equipment of the welders?
2. What are the reasons why welders must take safety into account?
3. What remedies should be put in place to cater for the safety needs of welders?
4. What are the level of welders' knowledge on storage facilities and welding equipment?

1.5 Significance of the Study

The significance of the study will include the following:

1. It is intended to create awareness among the public especially the workshop owners, master welders as well as the apprentices on the positive and negative effect in welding.
2. It would guide the general public and encourage authorities to ensure legislation on safety observance in the informal sector of welders.
3. It serves as an academic reference to researchers who may research into a similar problem.

1.6 Limitations and Delimitation of the Study

The study is meant to cover the entire Eastern Region but due to time space and financial constraints, it limits itself to only Akyem Kukurantumi instead of the whole region. The Kukurantumi in the New Juabeng Municipality has been selected for the study because of its population, commercial and business activities, especially welding activities and above all, their geographical locations in the mapping of the regions.

1.7 Organization of the Study

The structure of this research comprises of six chapters. Chapter one deals with the introduction, which forms the beginning of the main body of the study (background), including the problem statement, the purpose and objectives of the study, the research questions, significance of the study, limitation and delimitation, then the organization of the study. Chapter two focuses on the review of related literature, while the methodology of the study is the subject of chapter three. The chapter on methodology describes the research design, the population, sample techniques and sample size, data gathering instrument, pilot study and data collection procedure of the study. Also covered in the chapter are the variables of the study and the methods of data analysis. Chapter four presents the analysis of the outcome and discussion of findings with tables, figures and graphs. Chapter five presents the discussion of results. The discussion shall highlight the major findings of the study and inferences made from them in view of findings from related previous studies. Chapter six brings to bear the summary of findings, conclusions and recommendations. The major research findings would be itemized and show how it

contributed to body of knowledge (BOK). Use the correct length of ladder for the job. Never lash two short ladders to make a longer one.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.0 Introduction

This chapter presents a review of the literature on studies which focus on what other scholars, researchers have written about the observance of safety precaution among master welders, workshop owners and their apprentices.

2.1 General Observation of Safety in the Welding Industry

Ghana National Fire Service (2003) reports that accidental fire outbreak and electrocution claim more lives in Ghana every year. The report says most injuries are from electric shock and fire, which occurs through improper handling of gas cylinders. Secondly, some of these injuries are through direct contact with an exposed wire or other parts of electrical circuit such as electrical wiring or electrical appliance which are faulty. In carrying out the research work the writer saw the need for reading through a number of written articles already inexistence. This would enlighten the author or the researcher on the problem. The review will be considered under the following headings:

- General observations of safety in the welding industry.
- Causes of accident and death in the welding industry.
- Wearing of protective clothing.
- Care and handling of gases.
- Working on Heights.

Garg (2006) reports that, effort for the prevention of accidents began in the 19th century with the adoption of factory inspection laws was first in Britain and then in the United States and other countries (factory system). Fire insurance on accidents insurance companies made efforts to enforce safety rules and also to educate the public. Factory inspectors and inspectors from fire insurance and casualty insurance companies carried out a campaign against unsafe conditions of fire handling safe and actions was at the beginning of the 20th century and a new branch of engineers, devoted to finding and eliminating such hazards (industrial safety), State Insurance Company of Ghana.(SIC)

The Ghana National Safety Commission laws concerning workers compensation were passed on. By placing emphases on the employers, the financial burden of caring for the injured workers. Such laws created an incentive for providing safe machinery and working conditions for improved selection and training of employees or apprentices in the formal sector

Crane (1982) reported that thirteen thousand on the job deaths, 2.3 million disabling injuries and three hundred thousand welding and related workers are suffering from disease related to their work in the United States of America (U.S). Wild (1984) conservatively estimated three hundred thousand industrial accidents in the United Kingdom (U.K) annually.

The Taipei Times reports that Greek registered tanker went up in flames in Ghana's main port of Tema on the 25th March, 2005. The paper again reports that sparks from welding ignited a fuel leak on the Greek registered MV Polaris at the port of Tema which is cited 20 km east of the capital Accra. The vessel was totally lost and all human beings on board were feared dead. The energy minister by then, (Mr. Kofi Adah) told

reporters, those on board reportedly included twelve (12) Ghanaians, Guineans, Greek and a Russian who were carrying out welding repairs work on the MV Polaris. If the state of occupational safety in welding is as bad in the industrial and development as outlined, then the state of safety observance and other related issues in the welding sector in the country would be nothing to write about. This is because; working condition in the developing country like Ghana is very poor and also significant number of welding accident cases were escape without reporting

2.2 Causes of Accidents / Deaths in welding Industries

Welding is a hazardous occupation only if welder does not pay strict attention to safety rules and practices. Safety codes and standards have been written by many industries and Government agencies to help ensure welders' safety. Although machines are fitted with guards, there are still many processes which cannot be made totally safe; therefore, it is important that all workers should recognize the risks that are present in the workshop. Some danger and other risk are not recognized as risk inherent when working. For example the revolving parts of machinery and even when using hand tools. Welders must therefore developed an attitude of mind to observed these rules and practices to reduce death and accident at their workplaces.

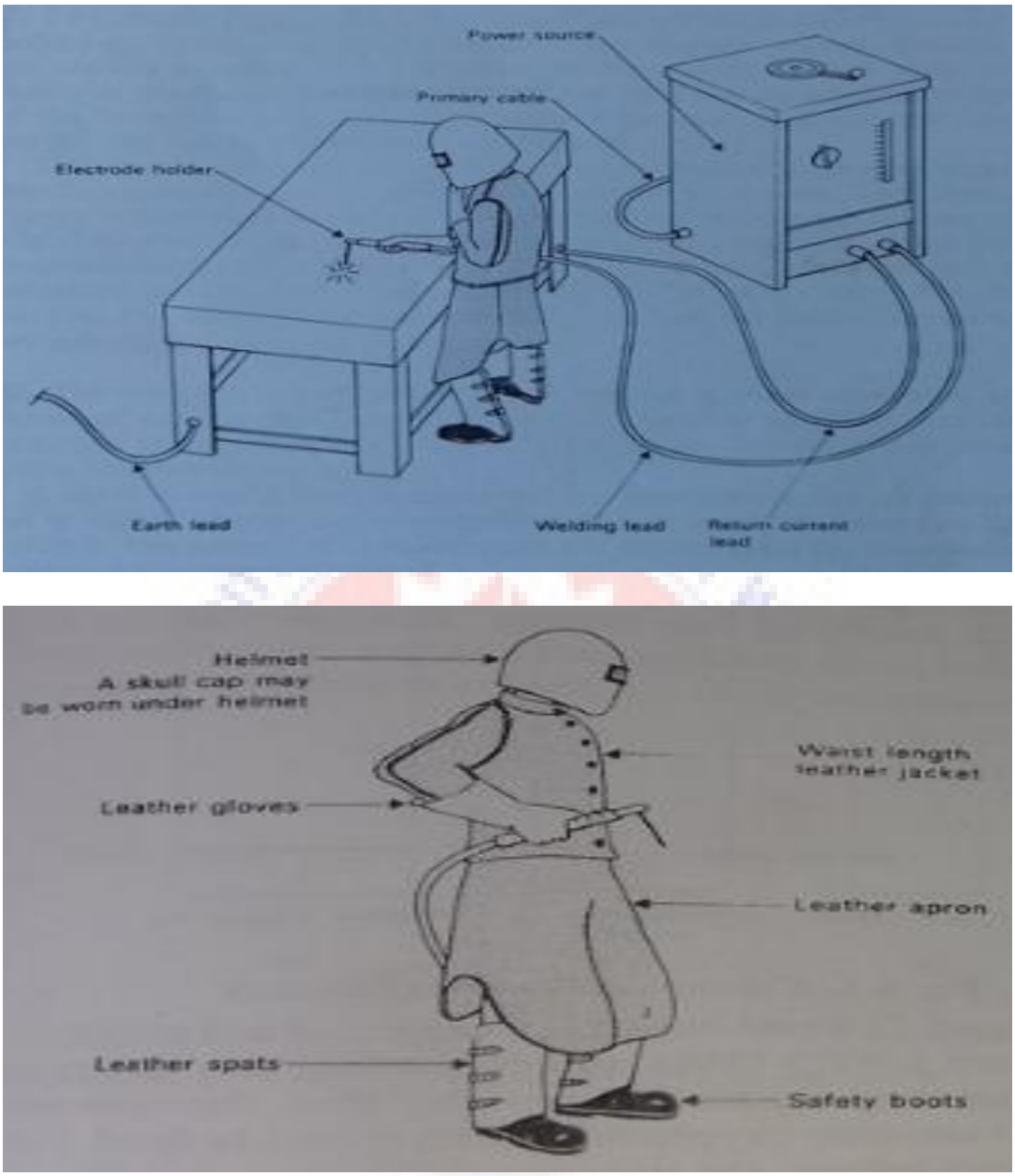

Figure 2.1 Wearing of protective clothing
Source; Technician Fabrication and Welding (1979)

A welder or apprentices must wear a protective eye shield to protect his/her eyes from the actinic rays produced by the welding arc. Intense bright light of this sort can be very damaging to the inner lining of the eye and may result in partial or permanent blindness. Although sunglasses with a light tint is sufficient for the eye protection from

the sun, a much deeper tint is required to protect the eyes during welding or cutting operations(Monks & Rochester, 2004).

Sackey and Amoakohene (1996) state that the ultraviolet rays during electric arc welding operation can injure the eyes of other people who may be near the welding area. The working area must therefore be protected with a welding screen. This should be made of fire resistance canvas painted with black or grey ultraviolet protective paint is recommended. An ideal situation in a school is to have welding booths. The welder wears welding helmet to protect the throat, face and forehead from the infrared and ultraviolet rays produced by the arc. A cap should be worn under the helmet to protect the scalp. The helmet is fitted with two lenses. The inner lens specially tinted is to protect the eye from the intense light and the invisible ray produce by the arc. The outer lens, which can be replaced, is clear and it protects the inner lens from being damaged by the metal particles. Most helmets should have an adjustable headband, so that the helmet can be raised or lowered when necessary. Welding hand shields can also be used during welding to protect the hands.

Leather aprons and gloves are flame-proof outfit which must be worn by the welder to protect the body from the sparks, the molten metal and the hot metal being welded. The apron should be long enough and the glove should be well fitted.

Figure 2.2 Protective safety boots and welding shields
Source www.shutterstock.com / safety.

Kenyon (1980), the legal requirement of the new health and safety at work Act 1974 has created for both employers and employees a more acute awareness of the need to take care of avoiding accidents, injure and disease. The act states "it shall be the duty of every employee while at work should take reasonable care for the health and safety to himself/herself and of other person" (e.g. striking of an arc, wearing of goggles during grinding chipping on a welded bead, replacing guards, keeping gangways clear, and

marking hot metals). It the duty of the employer to ensure that adequate protective equipment is available and that adequate guarding of machine are maintained so that they are safe when properly used.

Hoftman David (1982), listed the following factors to avoid injury.

- Lift gas cylinders with rope, slings and do not use as rollers.
- Be aware of electrical hazards such as bare wires, poor earth return connections and wet floor. (Use duck board to stand on.)
- Do not used compressed air to blow down cloths as the pressure can cause serious injury to eyes, ears and internal organs.
- Do not use oxygen as a substitute for compressed air and never use as a "sweetener" in compartments where the air is stale.
- Never remove guards whilst a machine is running and know where the stop button is. Do not start a machine without guards in position.
- Do not fool around in the workshop and always walk not run.
- Know the warning signs and safety colours and watch out for them.
- Use ventilation equipment to avoid dangerous concentration of oxides of nitrogen, ozone fumes from metals such as lead, zinc and Cadman. The following solvent also gives off dangerous vapours: benzene, carbon tetrachloride, trichloroethylene and perchlorothylene (poisonous phosgene gas). Never allow the following to come in contact with skin, lead paints, corrosive acids, paraffin or oils.
- Learn the different types of fire extinguishers.

2.4 Care and Handling of Gas Cylinders

Timmings Roger (1974), cylinders should be stored in a cool dry place away from excessive heat or corrosion. Acetylene cylinders should always be stored upright in a place vented to atmosphere with flame proof switches and lights. Empty cylinders should be kept separate from full ones. Acetylene cylinders should not be used as oxygen cylinders. No smoking or naked light/flame are allowed in the store which can cause fire easily. Fire extinguishers (carbon dioxide type) should be available in the work places.

O'con Robert (1982) cylinders should not be dropped from height or used as rollers, work supports or jacks. A rope sling should be used for lifting compressed gas cylinders, or special apparatus. Do not allow grease or oil to come in contact with cylinders, especially compressed oxygen, as this may cause an explosion.

O'con Robert (1982), added acetylene and apache gas should not come into direct contact with copper or alloys with above 70% copper as an explosive compound (copper acetylide) is formed. For this reason, the acetylene pipe from the manifold is conveyed in iron or steel pipes. Some gases may be delivered as liquid in large tankers and pipe as liquid into the firm's own storage tanks. Examples are oxygen, argon, propane and methane.

O'con Robert (1982) identifies the following as the possible causes of explosions when using gases:

- Testing for leaking cylinders, torches, gauges and connection.
- Inadequate ventilation in confined space.
- Transferring gas from one cylinder to another.
- Dropping and mishandling cylinders and equipment in the workplaces

- Using compressed oxygen as a means of ventilation or compressed air.
- Allowing hot metal and sparks to fly on to hoses and connection

Salvucc Frank (1985), state that the following colour scheme should be used to identify cylinders holding gases in common use. Yellow should represent toxic or poisonous gases and red or maroon inflammable gases. Some gas cylinders have a distinguishing colour band painted around the neck or down the length. Manufactures often paint an aluminum panel on the cylinder body to show up special marking and also attach identification labels.

Davis (1972), when welding galvanized articles, the welder should be in a well-ventilated position and if welding is to be performed for any length of time a respirator should be used. (In case of sickness caused by zinc fumes, as in welding galvanized article or brass, milk should be drunk). Davis (1972), stated that in heavy duty welding or cutting on an overhead welding, asbestos or leather gauntlet gloves, ankle and feet spats, protective clothing should be worn to prevent burns. When working inside closed vessel such as boilers or tanks, take every precaution to ensure a good supply of fresh air.

Davis (1972) continues that in welding or cutting tanks which have contained inflammable liquids or gases, precaution must be taken to prevent danger of explosion. One method for tanks which have contained volatile liquids and gases is to pass steam through the tank for some hours according to its size. Any liquid remaining will be vaporized by the heat of the steam and the vapour removed by displacement. Tanks should never be merely “swilled” out with water and then welded. Many fatal explosions have occurred as a result of this method of preparation. Carbon dioxide in the compressed form can be used to displace the vapour and thus fill the tank, though quite satisfactory

but is not always available. Tanks which have contained heavier types of oil such as fuel oil, tar, etc…present a more difficult problem since air and steam will not vaporize them. One method is to fill the tank with water, letting the water overflow for some time. The tank should then close and turned until the fracture is on top. The water level should be adjusted (by letting a little water out if necessary) until it is just below the fracture. Welding can then be done without fear as long as the level of the water does not drop much more than a fraction of an inch below the level of the fracture.

2.5 Working at Higher Levels

Troy Smith (1978), whenever a welder is required to ascend to a height in order to reach the workplace, the following are few of the many rules or regulations which should be observed for safety.

- Always have some breakfast, or at least a hot drink such as a cup of tea or coffee before you go to work, an empty stomach can often result in a sudden attack of faintness in even the healthiest person.

Safety belts or harness should be worn whenever possible and these must be securely anchored.

- All stairways and walkways should be fitted whenever practicable, with permanent toe boards, ladders should always be placed so that there is adequate space behind each rung for a proper foot hold. Particular attention should be paid this point at the landing platform.

- Always place tools and materials in position of stability, i.e. away from edges from which they might fall. A tool box or tool kit properly secured or hooked to o ladder or platform is to be recommended.
- Workers should not throw tools or materials down from aloft. Such irresponsible behavioral can result in fatal injuries to persons who happen to be below.

Shotbolt (1986), the building and construction regulations must contain a wealth of information on the safe use of ladders. The following "safety hints" will serve to indicate some of the many elementary precaution which should be regarded as standard procedure.

- Ensure that ladders are well constructed and of sound materials, and are well looked after.
- Do not paint ladders. They should not be painted because this tends to hide any defect and conceal danger.
- Never use an unsound ladder. No ladder should be used, for example, if it has a missing or defective rung, or when the upright (or stringer) show sign of splitting. Any defective ladder should be immediately destroyed.
- The correct pitch of a ladder must always be observed. The vertical height from the ground or base to the point of rest should be four times the distance between the base of the vertical height and the base of the ladder.
- Make certain that the ladder reaches at least one (1) meter above the landing platform. This is to prove a handhold while stepping from the ladder.
- Use the correct length of ladder for the job. Never lash two short ladders to make a longer one.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

The chapter deals with the research design, population, sample and sampling technique, instrument used, validity and reliability of the instrument, data collection technique and data analysis. In ensuring effectiveness of the data collected and of the fact that success of research will depend on the method employed in collecting basic information data, the following were considered:

- Research Design
- Population
- Sample size and sampling technique
- Instruments (Questionnaire, interview, observation)
- Scoring of the instrument
- Validity and Reliability
- Data Analysis

3.1 Research Design

The research design is a plan, structured and strategy of investigation concerned in the research to obtain answers to questions and to control safety. The design used for this study was a case study. According to Bell Judith (1995), a survey in research work is whereby the same questions are asked population with the aim of obtaining information from the representation of the population as a whole. The researcher employed assessment method, because the method is the best in finding out speculations on

people's knowledge on issues in the case of this study, the perception of people on observing safety precaution in the welding industries in Ghana.

3.2 Population

The population refers to the people from whom information was gathered for the research work. The researcher considered it important to the workshop owners, master welders and apprentice.

The survey was conducted at Kukurantumi as a catchment area in the Eastern Region. The district has a population of about nine thousand (9000) people. It has four (4) senior High schools, One Tech / Vocational school and a large number of Basic Junior High Schools. Farming, Galamsay, Trading and Diamond production are the major economic activities of the people in the district. Though there are sizeable numbers of people who are teaching, other are working with the Bank and the health sector

3.3 Sample Size and Sampling Technique.

Simple random sampling technique was used to select master welders, apprentices and welding shop owners at Kukurantumi in the Eastern Region of Ghana. The researcher upon realizing the size of the population to be enumerated, a sample size of 60 respondents was considered under the survey, consisting of 20 people from the Master welder, 20 people from Workshop Owners and 20 Apprentices out of the population. The sample for the study comprises some selected welders from each of the targeted area and they were selected at random

3.4 Instruments Employed for the Study

Since the survey method was used and aimed at collecting data to be analyzed and interpreted for the guidance and management of future course of action, the researcher used three main instruments for data collection. This included questionnaire, interview and observation which were used to solicit information. This was to ensure that real balanced research instruments had been used to solicit information.

3.4.1 Questionnaire

The research questionnaire is a systematically prepared document deliberately designed through the compilation of questions to elicit responses from respondents for the purpose of collecting data or information for the study. Sixty (60) questions were prepared for the population to answer. The questionnaires helped in a large extent to identify potential and prominent problem areas and again brought to light the general views of people concerning safety precaution in the welding workshop.

3.4.2. Interviews

The researcher met and interacted with respondent on face-to-face basis. This unstructured interview was used to solicit views, opinion and information with regards to indiscriminate act of some individual on observing safety precaution at welding workshop. In order to get divergent views from the individual, this interview was used was to determine the direction of the interview, thus getting wide varieties of opinion from the interviewees. This format is used in gathering the data that requires analysis of the individual person. These elite individual the researcher met were the master welder,

workshop owner and the apprentices. The master welders were interview on the difficulties apprentice encounter in the learning of the trade. The researcher also interviewed them on how best innovation could be made in terms of the observance of safety in the workshop. The head of the workshop was interviewed by the researcher to find out the structures that have been put in place to make adequate teaching and learning of the trade to be effective. The apprentices on the other hand were interviewed on factors that contributed to their inability to understand the concept in safety observance there by leading to their poor performance. Sixty (60) workers were interviewed in all by the researcher. I took twelve (12) days to complete the interview. Five (5) workers were chosen per day without any specific order.

3.4.3 Observation

This observation method was employed at workplaces and workshops where visited to have firsthand information of the nature of things they do at the workplace and the safety observed by welders. This method will yield a more accurate quantitative data than the self-report instrument; therefore the chosen instrument will help the researcher to identify the true behavior or picture of welders in the welding and fabrication workshop. I observed welders without their knowledge at the workplaces. The scope included welders' contribution during the working hours and their behavior was observed at the diagnostic stage. Lastly I observed the way they took a keen interest to their master explanation of things during the lesson delivery.

3.5. Scoring of the Instrument

The questionnaires were designed with a variety of question items to enable each respondent to select the appropriate responses or freely express his/her views or opinion where necessary. Some question items required ticking (√) the appropriate boxes corresponding to a set of responses. Respondents were expected to give answers such as YES or NO, Often, Frequent or Not at all the times. For the question that were open ended, respondent who could not read or write the question were interpreted in their own dialect and the responses were written down.

3.6. Procedure for Data collection

The procedure for collection of data from the population involve going to them at their various workshops. The individual were given ample time and needed assistance to the questionnaires. Also the researcher explained the rationale behind the project to the population in the cause of distribution of the questionnaires and later collected by himself.

3.7. Validity and Reliability of the Instruments

The researcher believes that if an instrument is not reliable it can't be a valid measure. Therefore validity refers to the extent to which an instrument measures can be used successfully for what purported is to ascertain the degree the measure is accurate for a specific purpose whereas reliability refers to the extent or the consistency of the instrument producing similar results given the same conditions on different occasions, by different researcher.

However, based on this knowledge, the researcher, drafted questionnaire and submitted for scrutiny, comments and suggestions were receive and correction were made; the question item was restructured for easy understanding. Upon approval, pilot study was conducted before they were given out to the respondents.

The responses were found to be successful with regards to the time given for various instruments. In the light of the above technique or procedure, the objectivity and consistency of the data collected, as well as the methodology used. The researcher sees the data and instruments used in collecting data as valid and reliable.

3.8. Data Analysis

The result of the questionnaire was analyzed and tabulated under the heading as the statements in the questionnaire indicated. The result of finding was therefore based on the statistical outcome of the questionnaire; unstructured interviews and observation made by the researcher.

CHAPTER FOUR

RESULTS AND FINDINGS

4.0 Introduction

This chapter presents the data collected and its analysis based on the research objective that is to assess the level of awareness of the benefits of the observance of safety precaution at Kukurantumi in the Kibi Municipality.

Table 4.1 The Biographic Data Of Respondents

Biographic Data	Frequencies	Percentages (%)
Gender		
Male	48	80
Female	12	20
Total	**60**	**100**
Age group of Respondents		
Below 20years	28	47
21 – 30 years	20	33
31 – 40 years	12	20
Total	**60**	**100**
Highest Educational Qualification		
Primary school	10	17
Junior High school	20	33
Senior High / Vocational school	30	50
Total	**60**	**100**

Table 4.1 shows a series of socio-demographic variables of the respondents. From the analysis of the gender distribution of the respondents, it could be observed that more than two thirds (80%) of the respondents were males whereas only 20% were females. The percentage of female respondents who participated in the study was low.

Regarding the age group of the respondents approximately 47% of the respondents were aged from below 20years of age, however, 33% were from ages of 21-30years. It is observed the lowest respondents were from the ages of 31-40years. This shows that majority of the respondents were from the youth group

On the highest educational qualification, it was found that half (50%) of the respondents have had senior high school educations as their higher educational qualification. In addition, only 10 (17%) of the respondents had primary educational studies as their highest level of educational qualification.

Table 4.2 Experience or duration of practice of profession response

Duration and Practice	**Frequencies**	**Percentages (%)**
Below 5years	9	15
5 – 10 years	11	18.3
11 – 15 years	19	31.7
21 and above	21	35
Total	**60**	**100**

In Table 4.2 In shows of experience or the duration of practice of profession of respondents, about 35% of the response have the highest working experience of 21 years and above working experience, also 31.7 % have working experience of 11 – 15years and 18.3 % have 5 – 10 years working experience, however, only 15 % have been practicing their profession for 5years and below. This implies that a good percentage of them are the youth and adults in the Welding and Fabrication trade.

Figure 4.1 shows the frequencies and percentages of information collected on gender.

4.1 Background Information of Respondents

Figure 4.1, Shows gender statistics of respondents

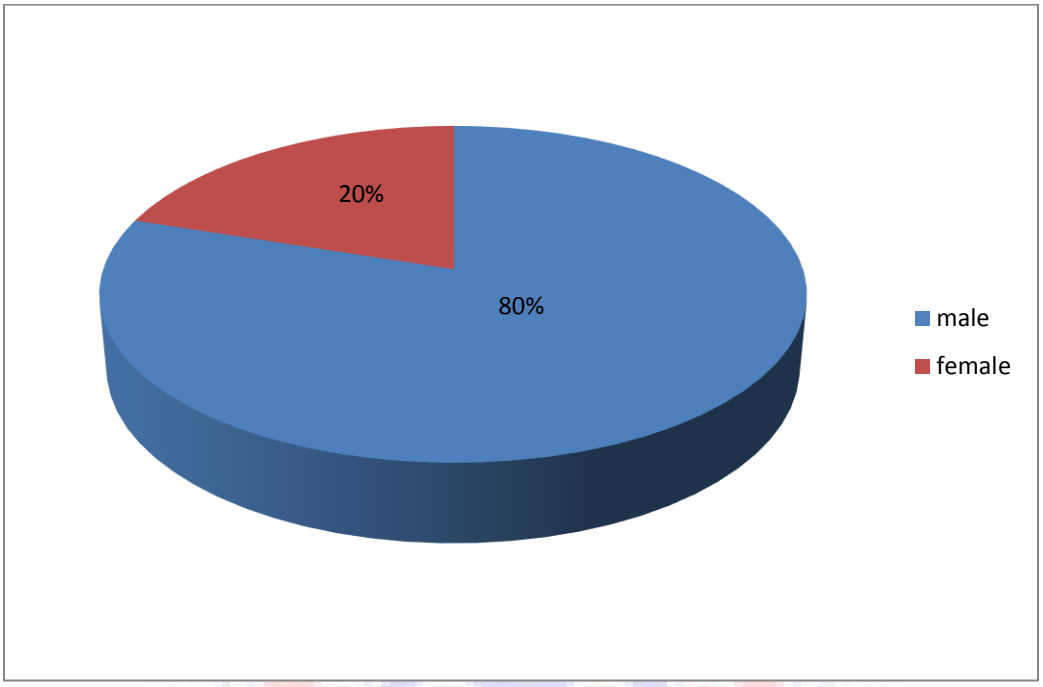

Figure 4.1: Gender Statistics of Respondents

Out of 60 respondents, 48 (80%) were males and 12 (20%) were females. This indicates that, the majority of the respondents were males.

Figure 4.2 shows the frequencies and percentages of respondents' educational level.

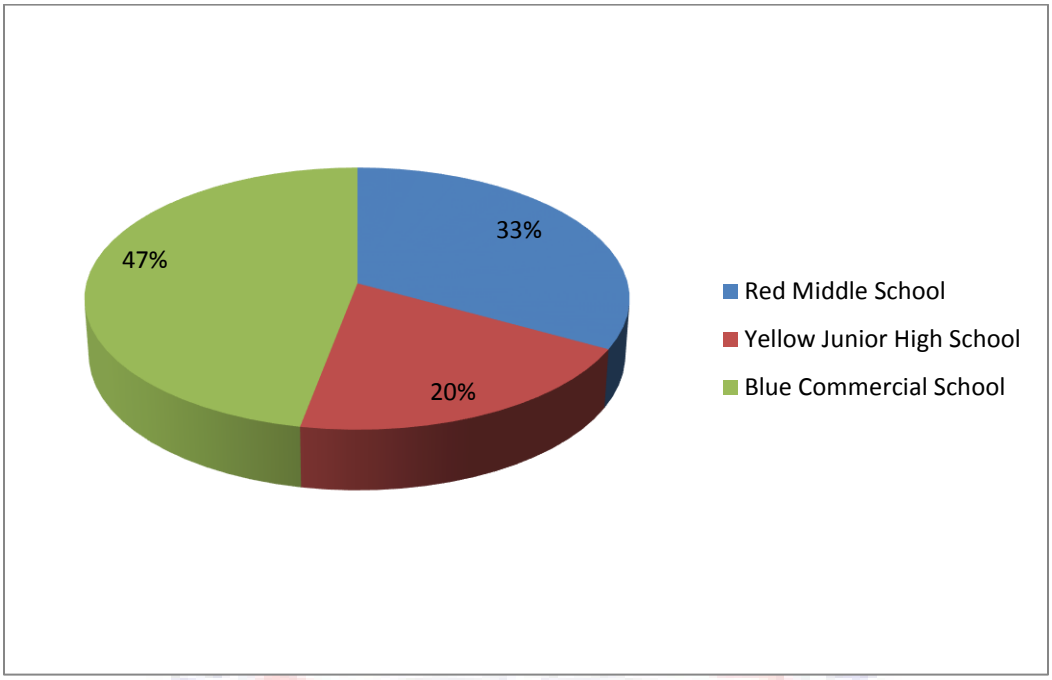

Figure 4.2: Respondents educational level

Figure 4.2 shows that out of 60 respondents, 28 (47%) were workshop owners with certificates from technical and commercial school. Also the master welders with qualification of Junior high school were 12(20%). But welding apprentice with qualification of middle school level were 20(33%)

Table 4.3 Total numbers of people selected were 60 respondents.

Number of People	**Frequencies**	**Percentages (%)**
Workshop Owners	28	47
Master Welders	12	20
Apprentices	20	33
Total	**60**	**100**

Figure 4.3 shows the frequencies and percentages of position of respondents.

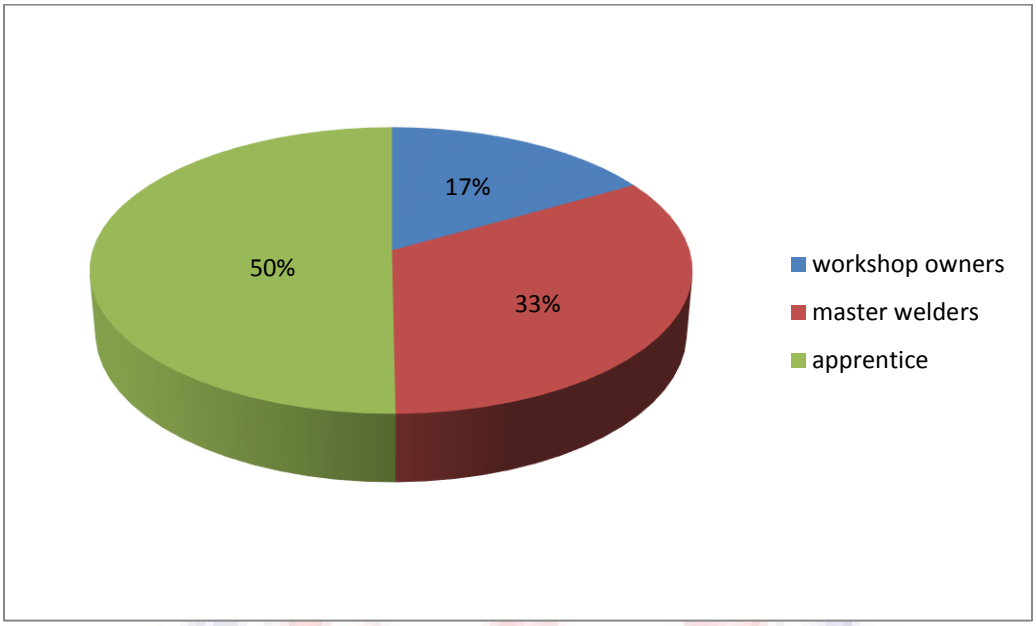

Figure 4.3: Position of Respondents

Fig 4.3; Shows the summary of the position of respondents.

Out of 60 respondents, 10 (17%) were welding workshop owners, 20 (33%) were master welders whereas 30 (50%) were welding apprentice.

Research Question One

Have welders had any training on safe handling of tools and equipment used in welding?

Four questionnaire items were used to seek the views of respondents on research question one. Item-by-item frequencies and percentages of the respondents are shown in Table 4.4

Table 4.4: Respondents views on training on safe handling of tools and equipment used in welding.

No	item	Cat	Yes (%)	No (%)	Total (%)
1.	Have you had any external training on safe handling of tools and equipment used in welding?	WO	8 (40%)	12 (60%)	100
		MW	13 (65%)	7 (35%)	100
		WA	5 (20%)	15 (75%)	100
2.	Do you know how to use the fire extinguisher at the workshop?	WO	11 (55%)	9 (45%)	100
		MW	16 (85%)	4 (20%)	100
		WA	8 (40%)	12 (60%)	100
3.	Have you been checking the fire extinguisher at the workshop?	WO	14 (80%)	6 (30%)	100
		MW	11 (55%)	9 (45%)	100
		WA	4 (20%)	16 (80%)	100
4.	Can you differentiate between oxygen and acetylene cylinders	WO	17 (85%)	3 (15%)	100
		MW	18 (90%)	2 (10%)	100
		WA	11 (58%)	9 (45%)	100

KEY: Categories CAT Welding Apprentice WA
Workshop Owners WO Master Welders MW

Item one from Table 4.4 was to find out whether respondents have had external training on safe handling of tools and equipment used in the welding, 8(40%) workshop owners responded yes while 12(60%) responded no. Thirteen 13(65%) master welders responded yes and 7(35%) responded no to it, whereas 5 (25%) welding apprentice responded yes while 15(75%) no.

Considering item two in Table 4.4, the researcher solicited respondents view on how to differentiate between oxygen and acetylene cylinders 11(55%) workshop owners said yes to the statement while 9(45%) also said no to the statement, sixteen (80%) master welders responded yes to it and 4(20%) responded no, whereas 8(40%0 welding apprentice responded yes while 12(60%) responded no to the statement.

Item three from Table 4.7, 14(70%) workshop owners said yes and 6(30%) workshop owners said no to it. Eleven (55%) master welders responded yes while 9(45%) master welders responded no to the statement, four (20%) welding apprentice said yes and the 16(80%) welding apprentice said no to the statement.

With reference to item four in Table 4.7, the researcher sought the view of responders to differentiate between oxygen and acetylene cylinders. Seventeen (85%) workshop owners responded yes to it and 3(15%) workshop owners responded no, while 18(90%) master welders said yes, only 2(20%) master welders said no to the statement. When eleven (55%) welding apprentice responded yes to it only few 9(45%) welding apprentice responded no to the statement

4.2 Welders Taken Safety into Account

Research Question Two

Do the training programmes for welders take safety into account?

Three questionnaire items were used to seek the views of respondents on question two. Item-by-item frequencies and percentage of responses are shown in the Table 4.5

Table 4.5. Respondents views on taking safety into account.

No	Item	Cat	Yes (%)	No (%)	Total
5.	Do you usually have training	WO	3 (60%)	17 (85%)	100%
	programmers in your	MW	12 (60 %)	8 (40 %)	100%
	workshop	WA	13 (65%)	7 (65 %)	100%
6.	Have you had training on	WO	2 (10%)	18 (90%)	100%
	gas leakage detection?	MW	17 (85 %)	3 (25%)	100%
		WA	13 (65%)	17 (35%)	100%

Findings on item six from Table 4.5, 3 (15%) workshop owners responded yes to the statement and 17(85%) workshop owners responded 'No' twelve (60%) master welders said yes to the statement while 8(40%) master welders also said 'No' to the statements. Thirteen (65%) welding apprentice responded to the statement while 7(35%) responded to the statement.

Table 4.6 Respondents view of welders taking safety into account

Cat	Cat	3months	6 Months	1year	None	Total
7. How often do you normally have training programmer on safety?	WO	2 (10%)	8 (40 %)	2 (10%)	-	100%
	MW	2 (10%)	3 (15%)	11 (55%)	1 (5%)	100%
	WA	2 (10%)	3 (15%)	6 (30%)	9 (45%)	100%

Respondents of welders taking safety into account

In Table 4.5, item seven was to seek respondents' view on the statement how often do they learn in training programs on safety sees on two (10%) workshop owners responded that every 3 month, 8(40%) workshop owner said 6 month and 2(10%) said one year. Eight (40%) master welders said every 6 month, 11(55%) said one year and 1(5%) said nothing at all to the statement.

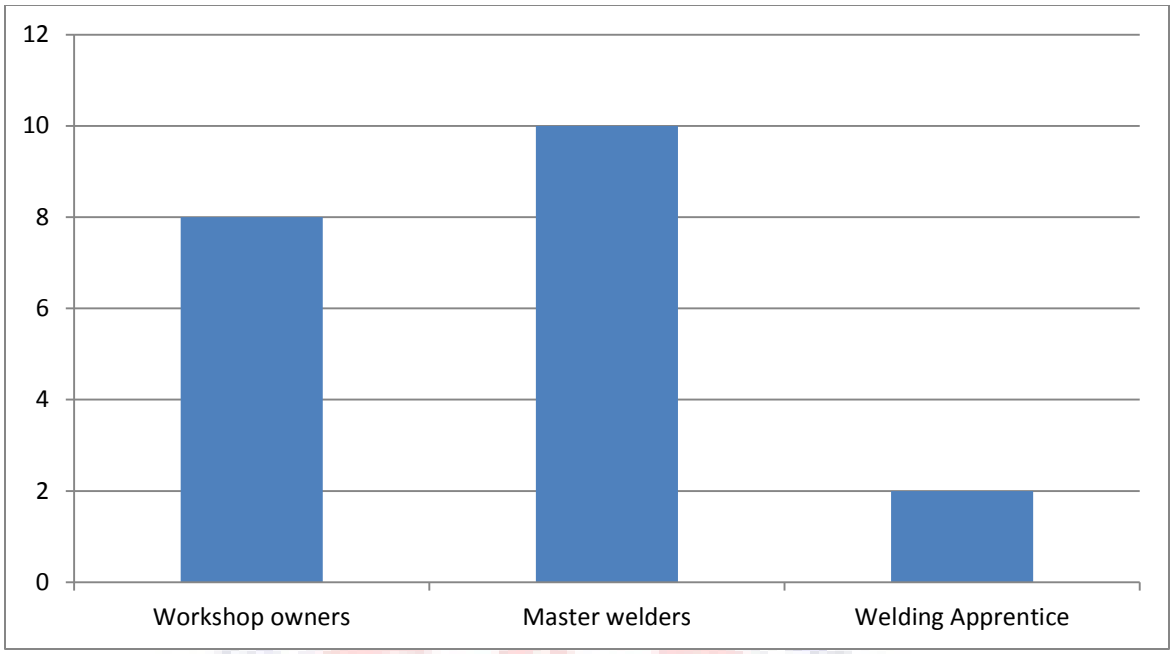

Figure 4.4 Respondents view of welders taking safety into account

Two (10%) welding apprentices said every three months 3(15%) welding apprentice said every 6 month, 6(30%) welding apprentice said annually and 9(45%) said not at all to the statement.

Research Question Three

What remedies should be put in place to cater for the safety needs of the welders?

Five questionnaire items were used to solicit the views of respondents on research question three. Item-by-item frequencies and percentages of responses are shown in Table 4.6

Table 4.6, Respondents' views on remedy put in place to cater for the safety needs of the welders.

No	Item	Cat	Agree	Disagree	Not sure	Total
8.	Use of safety goggles or	WO	15 (75 %)	4 (20%)	1 (5%)	100%
	welding shield protects	MW	19 (90 %)	1 (5 %)	- -	100%
	the eyes when welding.	WA	12 (60 %)	6 (30 %)	2 (5%)	100%
9.	Sandals and slippers are	WO	5 (25 %)	11 (55%)	4 (20 %)	100%
	not permitted in the	MW	18 (90 %)	2 (10 %)	2 (10 %)	100%
	workshop.	WA	2 (10 %)	16 (80 %)	- -	100%
10.	Periodic inspection of all	WO	5 (25%)	11 (55%)	4 (20%)	100%
	equipment should be	MW	16 (80%)	3 (15%)	1 (5%)	100%
	done to detect the faults	WA	3 (15%)	11 (55%)	6 (30%)	100%
	and damages					
11.	Workers should be	WO	3 (15%)	7 (35%)	10 (50%)	100%
	properly trained and must	MW	12 (60%)	8 (40%)	- -	100%
	wear protective clothes,	WA	4 (20%)	12 (60%)	4 (20%)	100%
	helmets and apron.					
12	All electrical wire should	WO	16 (80%)	4 (20%)	- -	100%
	have properly insulation.	MW	12 (60%)	8 (40%)	- -	100%
		WA	9 (45%)	7 (35%)	4 (20%)	100%

KEY: Categories CAT Master Welders MW
Workshop Owners WO Welding Apprentice WA

From Table 4.6, Fifteen (75%) workshop owners agreed to the statement 4(20%) workshop owners disagreed to it while 1(5%) owners' not sure of the statement. Nineteen (95%) master welders agreed to the statement, while 1(5%) master welders disagreed to the statement. Twelve (60%) welding apprentice agreed, 6(30%) apprentice disagreed and 2(10%) apprentice not sure of the statement.

Item 11 from Table 4.6 was to find out the respondents views on sandals and slippers some person used at the workshop. Five (25%) workshop owners agreed to the statement 16(80%) workshop owners agreed to the statement, 16(80%) workshop owners disagreed to the statement, while 1(5%) workshop owners not sure of the statement.

Eighteen (90%) master welders agreed to the statement, 2(10%) master welders disagreed to it. Two (10%) welding apprentice agreed to the statement, 16(80%) welding apprentice disagreed to the statement and 2(10%) welding apprentice not sure to the statement.

In Table 4.6, item 14 seeks respondents view on the fact that all electrical wires should be properly insulated. Sixteen (80%) workshop owners agreed to the statement while 4(20%) workshop owners disagreed to the statement. Twelve (60%) master welder agreed to the statement and 8(40%) master welder disagreed to it. Nine (45%) welding apprentice agreed to it, 2(10%) welding apprentice disagreed to the statement and 4(20%) welding apprentice not sure to the statement.

4.3 Knowledge about Storage Facilities for Welding

Research Question Four

Do welders have sound knowledge about storage facilities for welding equipment? Four questionnaire items were used to solicit the view of respondents on research questions four. Item-by-item frequencies and percentages of responses are as shown in Table 4.7.

Table 4.7: Frequencies and percentages views on whether welders have sound knowledge about storage facilities for welding equipment.

No item	Cat	Yes (%)	No (%)	Total
15. Should empty and fill cylinders	WO	6 (30%)	14 (70%)	100%
be stored together?	MW	2 (10%)	18 (90%)	100%
	WA	9 (45%)	11 (55%)	100%
16. Are you satisfied with the way	WO	14 (70%)	6 (30%)	100%
welding equipment are stored in the	MW	17 (85%)	3 (15%)	100%
workshop.	WA	12 (60%)	8 (40%)	100%
17. Should cranes be allowed to carry	WO	3 (15%)	17 (85%)	100%
or keep load suspended overnight in	MW	2 (10%)	18 (90%)	100%
the workshop?	WA	8 (40%)	12 (60%)	100%
18 Equipment and tools used in the	WO	12 (60%)	8 (40%)	100%
workshop are properly insulated with	MW	11 (55%)	9 (45%)	100%
the correct material?	WA	6 (30%)	14 (70%)	100%

KEY: Categories CAT Workshop Owners WO
Master Welders MW Welding Apprentice WA

The respondents view on item 15 from Table 4, on research questionnaire, should empty and filled cylinders be stored together? 12(60%) workshop owners responded yes, 16(80%) workshop owners responded yes to the statement and 2(10%) master welders responded yes to the statement, 18(90%) master welders responded not the statement.

Item 16 from Table 4 was to find out whether respondents are satisfied with the way welding equipment are satisfied with the way welding equipment are store in the workshop. Fourteen (70%) workshop owners responded yes to the statement, 6(30%) workshop owners said no to the statement while 12(60%) welding apprentice responded yes to the statement and 8(40%) welding apprentice responded no to the statement.

Summary statistics on Table 4, item 17, sought the view of respondents on cranes should be allowed to kept under suspended with load in the workshop. Three (15%)

workshop owners said yes to cranes should not be allowed to keep under suspended with load in the workshop, 17(85%) workshop owners responded no to the statement. Two (10%) master welders said yes to the statement and 18(90%) master welders responded to cranes should not be kept under suspended with load in the workshop 12(60%) welding apprentice also said no to the statement.

Findings from item 18 on Table 4 was that 13(65%) workshop owners responded to the statement, 7(35%) workshop owners said no to the statement. Eleven (55%) master welders responded yes to tools and properly insulated and 9(45%) master welders said no to the statement. Six (30%) welding apprentice also responded yes to it while 14(70%) welding apprentice said not o the statement.

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

Discussion of the findings are done according to the research questions and in each case preceded by a theme research question. This section of the study discusses and the analysis of the questionnaire was given to the respondents. It is based on the sum total of the various option presented by the respondent and it is converted to percentages. The individual views of the respondents is relating to the open ended item of the questionnaire were considered and summarized on the training and safe handling of tools and equipment. The study therefore, is to assess the level of awareness and the benefit, the perception and the knowledge level in the observance of safety precaution in the welding workshop.

5.1 The training On Safe Handling of Tools and Equipment Used in the Welding Workshop.

In the proceeding chapters, we had a lengthy discussion over identifying the research problem and reviewing the literature through relevant safety observance theories. We are also making effort to the research problem through methodology data collection and finally analyzing data on meaningful ways unravel and then highlighting some futuristic events. The prime objective of the study is to make known the determinant to welders' apprenticeship training in Ghana. Therefore conducting a comprehensive discussion over data analysis, it is important that the analysis is thoroughly viewed. The study further found that 70% were uncertain about welding

equipment. This uncertainty by the respondents' calls for an intensive education to the master welders especially to those who will also intern be training other in the field of the welding and fabrication trade.

Another percentage of the respondents that is 40% of apprentices did not have any idea in most of the welding equipment used in the welding workshop. This revelation is alarming because workshop owners and master welders do not go through a proper formal education because it was revealed that most of them just pick up the Welding and Fabrication course as a way of getting of getting their daily income and if not taken a look at it result loss of properties as well as human life.

5.2 Welders Taken Safety into Accounts

The knowledge level mostly depends more and more on the diverse practices and measures adopted by management of the companies. The management of the 21st century firm should focus on innovative on welders and apprentices with employees' satisfaction, development and the well –being on workers. This will enable employees and the organization to achieve high performance.

The research objectives of the study was to assess the knowledge of welders and Table 4.3 shows the level of agreement in the descending order for the measures put in place by the respondents. Prendergost 1993 said, he considered the role of promotions in inducing firm specific skills. Provision of sick leave with pay, health insurance and retirement benefits for employees is the most important measure that will influence welder in the Ghanaian industry

Another measure that was scared much was the uses of the welding equipment. The low response to this is an indication that workers themselves sometimes do not know what they are entitle for.

5.3 Remedy Put in Place to Cater For Safety Needs of the Welders

The reports also identify design problems such as poor supervision on between apprentice and master welder as well as the workshop owners who normally store the products and the equipment, secondly faulty material been stored with wrong temperature and moisture are one of the main causes of defect in the component produce by the welders. On the other hand the reports admit that the identified constraints are unlikely to explain fully the sector's poor productivity performance of components produce by the Ghanaian welder. It therefore calls for further research in this area. From all the above it can therefore be concluded that if taxes on new welding material were to be on the reduce side , this must be waved off by the Government of Ghana would be a cheaper way for welders to afford and the law of training in the Welding and Fabrication must be reinforced by the sector. A category of respondents that is 30% indicated that they have more confidence in the welding trade therefore it does not matter much about the quality training. Also 55% of the respondents disagree with the above expression of other with that idea of not having quality training in the welding field. From all indication it is clear that many master welders and workshop owners under this category do not consult manufacturers' manual for information.

5.4 The Sound Knowledge of Welders about Storage of Welding Facilities and Equipment in the Workshop

One of the variables used to measure is supervision. This factor is low supervision based on the leadership by example. Leadership by example has the power to command followers to succumb and then motivate the recalcitrant welder who are in the trade to do the proper training on the job as they intended doing unruly. These acts of the supervisor will rather be silent and help the tradesmen to have a positive attitude in the job production. If master welder has acquired a good skill in the welding leadership then his trainee performance can be monitored, control and managed with high standard of quality of the product he is making. It was found out that about 55% of the welders are holders of Higher National Diploma who have a very high standard of quality and good sign for the Ghanaian industry.

In effective and inadequate communication among the masters, workshop owners and the apprentices is one of the areas that can affects tradesmen initiative and motivations. This problem here can increase a lot of mistakes in the welding and fabrication firms as well as their quality in the production industry. Poor communication among parties can involve other people who on the other side cannot speak his master language fluently. On the other hand productivity problem will enter into the trade will ranges from resources shortage to intractable disputes among the welder participants. Therefore effective interactions among all parties will bring a successful completion of good work. These revelations reaffirm the study of Thomas et al; (2002); Chan and Kumaraswamy (2002), who propane that interpersonal relation is one of the bottle neck of productivity. This lack of recognition good and efficient of workers and also

disregards of tradesmen suggestion can create a negative motivational force among tradesmen which will get reflected in the productive capacity of the work force in most welding workshop in Kukurantumi as well as Ghana among the develop country. Secondly supervisor absenteeism during working hours can also results in the operatives let alone of talking on unproductive or idling at the work places. Lack of experience of workshop owners and master welders can increase errors, corrections rework of products and this will result double cost to the firm or company. Therefore, a good management integration and coordinating can easily bring together the various functions and multiple the interest of stake holders. This way will be a source of achieving good productivity and quality performance of the work will be assured. Most often these inexperienced of workshop owners and master welders would accelerate the schedule by increasing the number of workers which will result in congestion in the sector if plans from the Ghana Engineers Council are not put in place ahead of time to overcome the degree of overcrowding the number work men in the welding trade.

CHAPTER SIX

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

6.0 Introduction

This chapter, seeks to summarize the stages and the procedures used in the study. It reflects on the research findings, recommendations, implementation of the recommendation, post intervention assessment and conclusion.

The issue of safety in the welding workshop or industry has drawn the attention of engineers, fabricators and employers all around the world for some centuries and now, all measures are being adopted to find solutions to curtail them in order to secure the safety observance and health of welders.

The Engineering Council of Ghana also share in this phenomenon which has prompted the researcher to study deeper into the problems of safety observances and come out with solution to prevent or reduce such accidents and unhealthy conditions to the people at Kukurantumi in the Eastern Region of Ghana.

6.1 Summary of the Findings

The study was intended to find out the condition of welders at the welding workshops at Kukurantumi and also to ensure that, proper measures are observed by the shop owners. The welders and apprentices must conform to the right lay down regulations. It was also intended to inculcate into the artisans the need to be safety conscious in order to prevent electrocutions and death issues which results in the welding industry.

Four research instruments were used, questionnaire, literature research, interview and observations on the sample of the population. A sample size of 60 persons was selected from the various categories of welders. Twenty (20) welding workshop owner twenty (20) welders and twenty (20) apprentices. The artisans were selected using random sampling. Both the interview and the questionnaire were used to collect data from the respondents.

The causes of accidents in the welding industry brought to the light by the study of welders are as follows

- Carelessness was on the part of the welders, others were over confidence when welding little or minor metals, workshop organization has no compliance of regulation pertaining to the welders. Incompetency and lack of educational training on safety rules. There was also poor supervision in their activities concerning safety.
- It also came to light that the artisans do not have any "mouth piece" or Association hence any co-ordinate and control of their activities. Very few of the shop owners adopt measures to ensure their employees' safety but such measures are inadequate.

6.2 Conclusions

Findings of the research revealed that the occurrences of accidents in the welding workshop are within acceptance level. The main problem is the lack of basic training in safety, carelessness in handling and use of welding equipment by the artisans without taken safety into consideration.

The world is now a “Global village” thus Ghana cannot afford to be left behind the Globalization and Industrialization which came about as a result of science and Technology, therefore measures should be put in place to enforce safety rules and regulation at the various workshops. Our Engineers, Artisans and other craftsmen must be well organized for the socio-economic growth and development of our country Ghana.

Furthermore, a nationalistic approach should be adopted to transform the welding workshops in Ghana to match with the international standards of fabrication and welding. I emphasize that all the necessary aspect in terms of safety must be in place in place before a workshop must come into operation.

6.3 Recommendations

a. Evidence of the findings of the study revealed that some of the welders have limited knowledge in Vocation or Technical Education. In view of this, I suggest that stake holders in education should come out with training workshops to help the welders through short courses like part time, evening classes in safety use of equipment.
b. The welders need to be mobilized and organized into an association for workshops to be organized for them on the need to observe safety.
c. The Ghana Engineers Council should include Artisans of welding speciality in their organizations for training programmers to be developed for the artisans.
d. Workshop owners should ensure that proper and adequate logistics are put in place to ensure safety in their work at the workshop.

e. There should be an intensive education and training of the artisans on the need for their safety both to their lives and also to their property.

f. The constraints and technicalities inhibit an in-depth study into the waste disposal and management and the environmental hazards caused by the artisans. It is hoped that this specific area could be researched into the foreseeable future. The research involved an extensive travelling to and from the research centre hence funds should be provided to the researcher as a means of transport to make him/her mobile and enable him/her to cover other parts of Ghana.

g. The researcher believes strongly that if these suggestions are implemented, the issue of safety and precaution in welding and fabrication industry would be a problem of past.

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APPENDIX

UNIVERSITY OF EDUCATION, WINNEBA

COLLEGE OF TECHNOLOGY EDUCATION, KUMASI

QUESTIONNAIRE FOR; WORKSHOP OWNERS, MASTER WELDERS AND APPRENTICES

This research is about seeking information to assist in assessing the observance of safety precaution in Welding and Fabrication workshop and also to identify how safety is adhered to.

The researcher would be very much appreciative if you could respond to the questions below. Please tick [√] the appropriate box, you may comment where demanded. Thank you.

PERSONAL DATA

ORGANISATION:

AGE: 15—25 [ ] 26—35 [ ] 36—45 [ ]

Gender

Male [ ] Female [ ]

Level of Education

a. Primary school [ ]

b. Middle school [ ]

c. Junior high school [ ]

d. Commercial/Technical school [ ]

Position:

a. workshop Owner [ ]

b. Master Welder [ ]

c. Apprentice [ ]

WELDERS' TRAINING ON SAFETY MESEASURES.

1. Have you ever had external training on safe handling of tools and equipment used in welding?

A. Yes [ ]

B. No [ ]

2. Do you know how to use the fire extinguisher?

A. Yes [ ]

B. No [ ]

3. How often do you check fire extinguishers in your workshop?

A. Once a day [ ]

B. Once a week [ ]

C. Once a month [ ]

D. Annually [ ]

E. None [ ]

4. Can you differentiate between oxygen and acetylene cylinders?

A. Yes [ ]

B. No [ ]

5 Do you usually have training programmes in your workshop?

A. Yes [ ]

B. No [ ]

6 How often do you have training programmes in your workshop?

A. every three months [ ]

B. every six month [ ]

C. every year [ ]

7 . Have you had training programme on gas leakages detection?

A. Yes [ ]

B. No [ ]

REMEDIES PUT IN PLACE TO CATER FOR THE SAFETY NEEDS OF THE WELDERS

No	STATEMENT	RESPONSE		
		Agree	Disagree	Not sure
8	The use of safety goggle or welding shield protects the eye when welding.			
9	Sandals and slippers are not permitted in the workshop.			
10	Welders should wear some protective clothing in the workshop.			
11	Periodical inspection of all equipment should be done to detect the faults or damages.			
12	All electrical wires should be properly insulated			

WELDERS' KNOWLEDGE ABOUT STORAGE FACILITIES OF WELDING EQUIPMENT.

13 Empty and filled cylinders stored together?

A. Yes [ ]

B. No [ ]

14 How are welding equipment kept well in the workshop?

A. Yes [ ]

B. No [ ]

15 Were you satisfied with the way welding equipment are stored?

A. Yes [ ]

B. No [ ]

16 Should cranes be allowed to be kept suspended with load in the workshop?

A. Yes [ ]

B. Yes [ ]

STORAGE OF WORKSHOP EQUIPMENT

17 What type of welding equipment is used at the workshop?

A. Locally manufactured [ ]

B. Home used [ ]

C. Brand new [ ]

18 How are electrodes kept in the workshop?

A. In the oven [ ]

B. In plastic containers [ ]

C. In paper box [ ]

19 How do you store your own electrodes? ……...

20 Are all equipment and tools used in the workshop properly insulated?

A. Yes [ ]

B No [ ]