UNIVERSITY FOR DEVELOPMENT STUDIES



# USING PEDAGOGICAL TRAINING TO REDUCE DOMESTIC ELECTRICAL HAZARDS IN TAMALE NORTHERN REGION OF GHANA

BY

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# DECLARATION

**Candidate's Declaration**

I hereby declare that this thesis is my original research whose findings have not been presented for another degree in this university or elsewhere and that all citations in the work have been duly acknowledged.

| Ben Blanton Gidisu | ..... | ..... |
|---|---|---|
| Candidate's name | Signature | Date |

**Supervisor's Declaration**

I hereby declare that I supervised the preparation and presentation of thesis in accordance with the rules and regulations of the University for Development Studies.

| Rev. Fr. Dr. Thomas Asante | ..... | ..... |
|---|---|---|
| Supervisor's name | Signature | Date |

## DEDICATION

This thesis is dedicated to my late father, Samuel Blanton Gidisu, and my mother, Comfort Atsem for their immense contribution towards my upbringing and education.



## ACKNOWLEDGEMENT

I thank almighty God for the health and strength He gave me without which this sturdy would not have been completed. I wish to express my humble gratitude to my supervisor, Rev. Fr. Dr. Thomas Asante for his critical comments and guidance. I am most grateful to have you as my supervisor. To the electrical contractors Association of Northern Ghana and the Headmaster, teachers and pupils of Ahamadiya Junior High School, I appreciate the time you shared with me. Without you, I would not have had the opportunity to demonstrate how domestic electrical fire outbreaks could be minimized using pedagogy. I also thank the local artisans for the precious time they sacrifice for me to interact with them. Finally, I thank Mr. Napari, Simon, Godwin and Lukman for assisting in the data collection stage. May God bless you!



## ABSTRACT

Documentary evidence indicates that in the last decade, 593 homes and shops have been lost through electrical faults. Furthermore, interactions with owners of homes and shops in the Metropolis indicate that they do not embark on safety measures and precautions with regards to preventing electrical fire outbreak. When asked how many landlords and business owners will ensure safety in the home and workplace, only 24% of them indicated their willingness. The purpose of this study was to explore the impact of pedagogical training on the reduction of electrical hazards in homes and schools. The research design was the action research. The sample size for the study was 182, which comprised of 120 pupils, 50 parents and 12 electrical artisans. The study used a simple random sampling technique to sample Ahamadiya Junior High Schools in Tamale Metropolis. A simple random sampling technique was done by assigning numbers to the list of all JHS in Tamale Metropolis. The data collection instruments include exercise, questionnaire. The data collection procedures include situational analysis/pre-intervention, intervention and post-intervention. The SPSS version 20 was used to analyzed the data. The data analysis and presentation involved comparing pre-intervention and post-intervention results. The results of the study show that 8% of the respondents engage in health and safety measures and environment safety and electrical safety. The post-intervention results show that 25% of the local artisans said that they have heightened the use of projective materials for their personal safety at work. The projective materials or clothing used include goggles, hand gloves, safety boots and safety belts. The study recommends that there should be a policy which ensures that all homes, schools and offices are given to professionally trained and licensed artisan who will ensure compliance on safety measures are followed.

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## LIST OF ACRONYMS

| | |
|---|---|
| BLS | Bureau of Labour Statistics |
| ECG | Electricity Company of Ghana |
| GNFS | Ghana National Fire Service |
| ISSER | Institute of Statistical, Social and Economic Research |
| JHS | Junior High School |
| NEDco | Northern Electrification Distribution Company |
| NVTI | National Vocational Training Institute |
| PPE | Personal Protective Equipment |
| PVC | Poly-Vinly-Chloride |
| SPSS | Statistical Package for Social Scientists |
| UK | United Kingdom |
| UNESCO | United Nations Education Scientific and Cultural Organization |
| USA | United States of America |
| VRA | Volta River Authority |

# CHAPTER ONE

# INTRODUCTION

## 1.0 Overview

This section presents the background of the study, the perceived problem, diagnosis of the problem, evidence and causes of the problem. Other sections include statement of the problem, purpose, objectives, research questions and significance of the study.



## 1.1 Background of study

Electricity plays an important role in keeping homes, businesses and the economy running smoothly. Electricity is a good servant but it can equally be a bad master if not managed properly. The Bureau of Labor statistics in the United States of America indicated that 278 workers died from electrocutions at work in 1999. The Electrical Safety Statistics of the UK reported 20,403 fire outbreaks in 2016 due to electrical faults. In Ghana, the Ghana Fire Service showed that 90% of recorded domestic fire outbreaks are from electrical origin. The reasons adduced for these fire outbreaks include the unprofessional electrical installation practices in homes and shops.

In developed countries such as United Kingdom, Germany, US, etc it is a criminal offence for an unlicensed person to be engaged in electrical installations of any kind. Electricity regulatory authorities are empowered to monitor and control all electrical installations in homes and businesses. However, in Ghana, electricians do not need license to practice their profession. It is the responsibility of house owners and the electricians to do the right thing without supervision from external monitors. In many ways, safety measures are usually compromised. According to Ansah (2014) Ghana's specialist contractors may not adopt

safety practices at work because of the willingness of employers and employees to spend or invest in safety measures, equipments or practices; hazards are not considered necessary part and consequence of construction; and employees fear they might be penalized if they request for Personal Protective Equipment (PPE) from the employer.



Hazards due to electrical origins can be prevented when preventive measures such as proper electrical installation of homes, poor electrical contacts, short circuits, avoidance of fake electrical plugs and wires are practiced. Since, there is no functional regulatory body to regulate the activities of non-professional electricians, coupled with the high demand for electricity by households or consumers; there is the need to embark on education and training of electrical installation technicians, pupils, teachers and parents to understand the electrical hazards both in home and schools. Electrical installation technicians work with electricity directly in the homes, schools and offices. Potential hazards due to electrical origins can be prevented when preventive measures such as proper electrical installation of homes, poor electrical contacts, short circuits, avoidance of fake electrical plugs and wires are practiced.

Ignition may occur when cable joints are dry due to lose contacts, when electrical circuits are overloaded or when wrong cable gauge are used in wiring a house. For example, To connect a lamp holder to a socket using a flexible cord, the materials needed are, Lamp holder, one 5amps socket and 14/0.0076 flexible cord. The 14/0.0076 means that the cable consist of 14 strands each of 0.0076 in diameter. And to connect a flexible cord to 13amps fuse plug, the material needed are, 70/0.0076 three core flexible cord, one 13amps fuse plug. When the technician interchanges these cables and used the latter for the former in the example, the cable will be overloaded and may ignite. These are some of the problems this research has identified and seek to provide preventive interventions through training.

Training is defined as organised activity aimed at imparting information and instruction to improve the recipients performance or to help him or her to attain a required level of knowledge and skill. When people are trained in their field of operation, they increase in knowledge and skill, this means that, they will apply the knowledge they have acquired and this will translate to good job and value. The impact of any educational system can only be as powerful and effective as the teachers or the educational leaders who actually perform this profession. The lives of all learners are shaped by the teachers. A teacher can easily become an educational leader, can create positive change in the classroom and in the lives of his/her students and can shape the environment, or even the future of the country. Proponents of flexible adaptive instruction recommend that educational products be designed and developed in a way to allow easy re-configuration by teachers or others using the product (Schwartz & Bransford, 1999).

Giving users more control is consistent with discovery learning, a theory that supports the idea that learning is most effective when the learning process involves inquiry rather than memorization (Barab et al, 2001; Bransford, & Cocking, 2002). Raymond (2010) defined training as a planned effort by a company to facilitate employees learning of job related competences. Once the individual is knowledgeable and skillful on his job, he builds confidence and moral level will be high and this will improve his performance. Aswathapa (2000) also defined training as the process involved in improving the attitudes, skill and abilities of the employees to perform specific jobs. As modern homes are getting sophisticated with electrical appliances, so must electrical artisans be quick to upgrade and update old talents and developing new ones (Stavrou, 2004).

The main goal of training is to provide, obtain and improve the necessary skills in order to help organizations to achieve their goals and create competitive advantage by adding value to their key resources. The key resources of every organization is its human resources, as human beings form part of the equation, the potentials of error, bad attitude to work and not doing the right thing are high. It is the obligation for every worker in Ghana to take responsibility of their safety at work and it is not only the responsibility of the employer. Most electrical installation masters and their apprentices need to take education and training important to help mitigate the dangers associated with negligence of their work.



### 1.2 Perceived problem

Electricity consumption in Ghana has been growing at 10 to 15 percent per annum for the last two decades. According to the Institute of Statistical, Social and Economic Research [ISSER] (2006), the average demand for electricity over the next decade will be about six percent per year. Therefore, hazards associate with it and its management should not be overlooked. According to Ghana Statistical Services, the main source of electricity to Tamale is the Akosombo Hydro Electric Dam, and transmitted to Tamale by GRIDco. Northern Electrification Distribution Company (NEDco) is the main electricity distribution company in Tamale. Though, electricity is a good servant it can also be a bad master. This is because many lives and properties are lost due to lack of safety measures regarding electricity.

### 1.3 Diagnosis of the problem

Field visits to 50 homes in Tamale Metropolis by the researcher to investigate how extension cords are used revealed that out of the 50 homes visited, 46 extension cords were overloaded. For example, if a refrigerator, heating iron, and microwave equipments are plugged on a 13Amps extension cord at the same time, the extension cord will be termed overloaded. The

researcher also discovered that some homes in Tamale Metropolis are converted into still cutting and electric welding workshops. These modifications are powered by old wiring system which was not designed to carry heavy load machinery.

Documentary evidence indicates that in the last decade, 593 homes and shops have been lost through electrical faults. Furthermore, interactions with owners of homes and shops in the Metropolis indicate that they do not embark on safety measures and precautions with regards to preventing electrical fire outbreak. When asked how many landlords and business owners will ensure safety in the home and workplace, only 24% of them indicated their willingness.



An electrical installation in a building comprises various kinds of electrical apparatus fixed in position ready to be used together with the necessary connecting conductors, cables, fuse, and control gear. Most of the times, private developers in Tamale employ the services of electrical installation technicians to interface between the metering facility provided by the power supply authority. Research available shows that most of these electrical installation technicians acquired their wiring skills through apprenticeship and most of them have basic educational qualification.

**Evidence of the problem**

Through pre-interview discuss, there are still burnt houses and shops in the Metropolis. There is also evidence pointing to the fact that many homes and shops do not have safety contingencies in place to attack electrical disaster if they occur. Furthermore, many homes and shops use unapproved cables and wires for electrical installations which result in fire outbreaks when there is too much load on the cables and wires. Managing electrical installation is one of the major challenges facing the industry, and it should therefore not be

seen as a onetime project since it is going to be in operation for a long time. During the initial stages of wiring a home, all stakeholders on the project including, the home owner, the installation technician, and regulatory agent do not necessarily take keen interest on the project to ensure that electrical wiring regulation standards are complied with to prevent man made hazards of electrical origin. Some of the reasons for electrical fire outbreaks include engaging the services of unlicensed and unprofessional electrical wiring technicians, leading to about 90% of fire outbreaks in Ghana.



**Causes of the problem**

Statistic available from the Ghana Fire Service Department shows that about 90% of all domestic fire outbreaks in Tamale Metropolis was due to electrical origin. The causes of electricity fire outbreaks include exposed electrical joints, non-compliance of wiring color coding rules, unearthed electrical installations in some of the houses, and over loading of electrical socket. Studies have also shown that lack of education of parents, pupils/students and teachers of the dangers and hazards of electricity have contributed to fire outbreaks in homes and schools.

Furthermore the use of unprofessional in wiring homes and shops. In Ghana, more than 80% of the electricians are untrained and unqualified. The untrained electricians also lack the capacity to provide education to users of electricity. As a result, the awareness of domestic hazards resulting from electrical installations is not given the much needed publications. The problem is because the electricians have low incomes to gain access to Technical institutions to acquire basic knowledge and skills in order to enable them to offer professional advices to users of electricity.

### 1.4 Research problem

According to the United Nations Education Scientific and Cultural Organization (UNESCO) (2006), teacher training is one of the most important dimensions of an emergency response to electrical hazards. Training colleges and their prospective teachers have a significant role in education and pedagogical training (UNESCO, 2006). Nicolai (2003) also believes that during and after emergencies like electrical disasters, training is significant. According to Nicolai (2003) trainers need to acquire new knowledge, strengthen their skills and gain new teaching methods so that they in turn inculcate to pupils some behavioral attitudes that will enable them to avoid creating and causing electrical hazards. UNESCO (2006) highlights the importance of theoretical knowledge as well as pedagogical training as part of trainers' education. Since no empirical studies have been done on the roles of pedagogical education and training to minimize electrical disaster, this current study is relevant in order to investigate the roles pedagogical education and training can contribute to reducing electrical hazards in Tamale Metropolis.

### 1.5 Purpose of the study

The purpose of this study was to explore the impact of pedagogical training on the reduction of electrical hazards in homes and schools.

### 1.6 Objectives

The following are the specific objectives of the study:

1. Determine the training and development programmes available to unprofessional electricity artisans in Tamale Metropolis,
2. Assess the attitudes of parents and pupils using electricity and electrical appliance in homes and schools, and

3. Discuss how pedagogical training can contribute to the reduction of electrical hazards in homes and schools.

### 1.7 Research question

The following research questions were posed in the study:

1. What kinds of training and development programmes are available to unprofessional - electricity artisans in Tamale Metropolis?
2. What are the attitudes of parents and pupils using electricity and electrical appliance in homes and schools?
3. How does pedagogical training contribute to the reduction of electrical hazards in homes and schools?

### 1.8 Significance of the study

The study will augment the understanding of the roles of pedagogical training in minimizing the effects of electrical hazards. Therefore, policy makers and development practitioners can use the insights from this study to highlight opportunities, risks and trade-offs in this development agenda.

Secondly, in addition to the Ministry of Energy, the Energy Commission of Ghana, Electricity Company of Ghana and Volta River Authority, a number of entities such as the National Vocational Training Institute (NVTI), and Tamale Technical University provide capacity building and technical support to domestic and companies using electricity. Such institutions and organisations will be interested in knowing how best their resources (e.g., capacity building) have impacted on technicians and consumers to minimise electricity hazards in Ghana. A study of this nature is relevant to ECG, VRA, etc in their planning to

support homes and consumers since the study will reveal training gaps that need further attention. Thirdly, there are no empirical studies on the roles of pedagogical training for minimising electricity hazards in Ghana. Therefore, the results of the work will undoubtedly serve as a source of reference material for other researchers interested in similar studies.



# CHAPTER TWO

# LITERATURE REVIEW

## 2.0 Introduction

This section presents the theoretical and empirical review of related literature. The aim of this section is to assess the gaps existing in the literature. The specific issues reviewed in this section included the nature of electricity, causes of hazards due to electrical origin, attitude and learning, electrical installation and safety measures, the role of regulatory authorities, training institutions, pedagogical training, and training and development.



## 2.1 The nature of electricity

According to Benjamin (1762), electricity is a form of energy, which allows the flow of elections. All matter is made up of atoms and an atom has centre called a nucleus. The nucleus contains positively charged particles called protons and uncharged particles called neutrons. The nucleus of the atom is surrounded by negatively charged particle called electron. The negative charge of an electron is equal to the positive charged of a proton and the number of electron in an atom is usually equal to the number of protons. When the balancing force between protons' and electrons is upset by an outside force, an atom may gain or lose an electron. When electrons are lost from an atom, the free movement of these electrons constitutes an electric current.

Although electrical energy is convenient and pollution free, it is widely used in a variety of areas including homes and schools, but when managed incorrectly it is in the nature of electrical energy to cause disasters such as accidents or fires. Accidents and disasters caused by electricity can be categorized into several groups depending on the situation, but the main

categories of accidents occurring in homes and industries are electric shock and electrical fires. The nature of electricity is such that it can be compared to the flow of water from a regulated source to a destination. The medium for water to flow from one place to another is a pipe line and the source of energy is a pumping station or a reservoir.

In the case of electricity, the source is power generating station such as Akosombo Hydro Electric Dam in Ghana, or diesel portable power generating station and the medium for carrying the current to its destination is a conductor. Managing current carrying conductors in our homes poses serious challenges to health and must be handled professionally. Managing current carrying conductors in our homes poses serious challenges to our health and must be handled professionally.



Any material which will allow the free passage of an electric current is known as a conductor. Conducting materials vary in the degree to which they can conduct electricity. Good conductors are required for connecting leads in electric circuits so that they may convey the current with a minimum loss of voltage. Materials giving a somewhat higher resistance are sometimes needed for controlling currents, similar materials are also enquired for the construction of heating elements where heat is produced by forcing a current through a relatively high resistance. Some typical materials used as conductors in electrical circuits are as follows; silver, copper, aluminum, brass, nichrome, eureka, manganin and tungsten.

Any material which does not allow the free passage of an electric current is known as an insulator. Insulators are used to confine electric current to the conductors in which they are intended to flow and to prevent leakage of electricity to adjacent conducting material which are not intended to become alive. Insulation is also needed to prevent short circuit between

various parts of an installation. Some commonly used insulators are; rubbers, PVC (Poly – vinly – Chloride), paper, mineral insulation, mica, asbestos, paxolin and Bakelite. There are many types of cable used in electrical circuit but they all consist of the following main parts, conductor, insulation, and mechanical protection.

### 2.1.1 The Ohm's law

Every circuit or conductor present some opposition to the flow of electric current which has to be overcome by the electrical pressure applied to the circuit. This opposition is called the resistance of the circuit and is measured is ohms (abbreviate symbol R). Experiment shows that the electric current flowing through a conductor or circuit is directly proportional to the electric pressure applied to it, provided that the resistance ® is not altered in any way. The ohms law can be expressed as E (volts) = R (Ohms) x I (amperes). It can also be expressed mathematically in three ways;

1. $I = \frac{E}{R}$
2. E = R X I
3. $R = \frac{E}{I}$

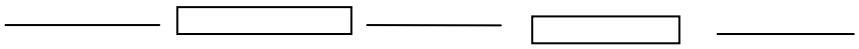
Where I= current, E= Voltage and R = Resistance

### 2.1.2. Electrical circuits

There are three main electrical circuits or three ways of wiring. These are series wiring, parallel wiring and series parallel wiring. Figures 1, 2, 3 and 4 respectively show how these connections are made

R1 R2

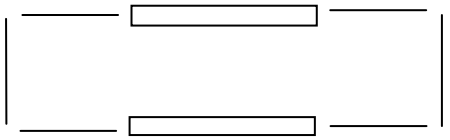
**Figure 1: Series circuit**



$$R_T = R_1 + R_2$$

$R_1$

**Figure 2: Parallel Circuit**

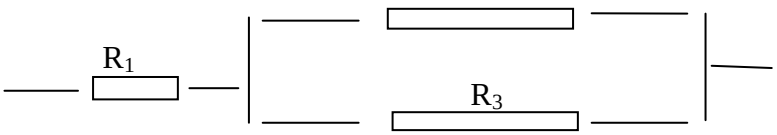


R2

$$R_T = \frac{1}{R_1} + \frac{1}{R_2}$$

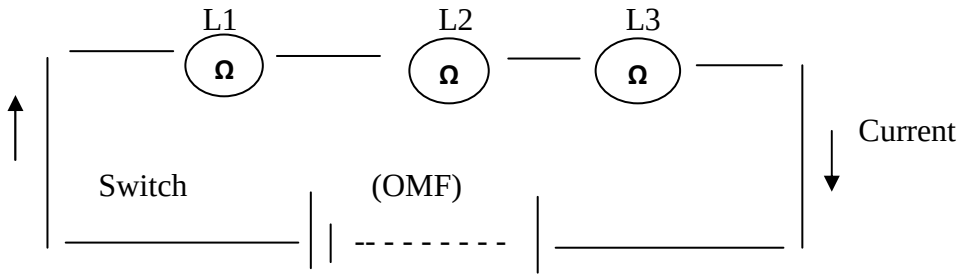
**Figure 3: Series parallel circuit**

**$R_2$**




$$R_T = R_1 + \frac{1}{R_2} + \frac{1}{R_3}$$

**Figure 4: Series connection of lamps**



An electric circuit is defined in the IEE regulation as an arrangement of conductors for the purpose of caring current. Before an electric current can flow in a circuit two conditions must be fulfilled.

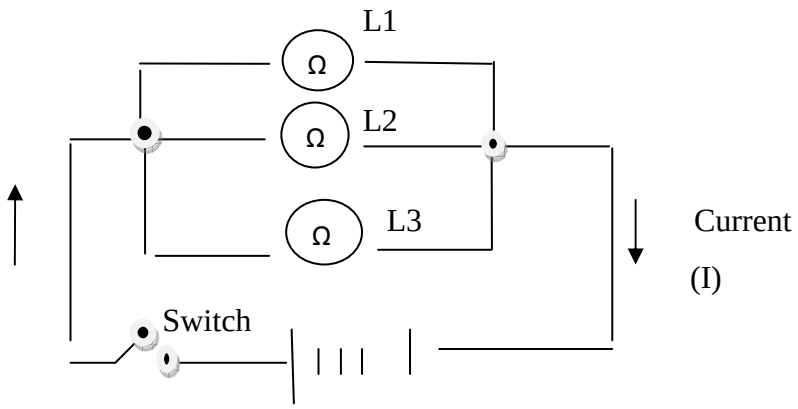
1. There must be a source of electromotive force i.e. (voltage) emf to overcome the resistance of the circuit and so force the current around it.
2. There must be a complete path of conducting materials through which the current can flow.

In a series circuit, the connections are such that the electric current flows through each part of the circuit in turns. Each component in a series circuit receives the same amount of current but the supply voltage is shared between the components. Series circuits are not suitable for general used as it is easier to provide a supply at constant voltage than to provide a constant current supply. Also, it is difficult to provide suitable switching arrangements to control individual parts of a circuit. There are however, some circumstances in which series circuits can be used for decorative lighting circuits using a number of identical low voltage lamps and battery charging arrangements.



### 2.1.3 Parallel circuits

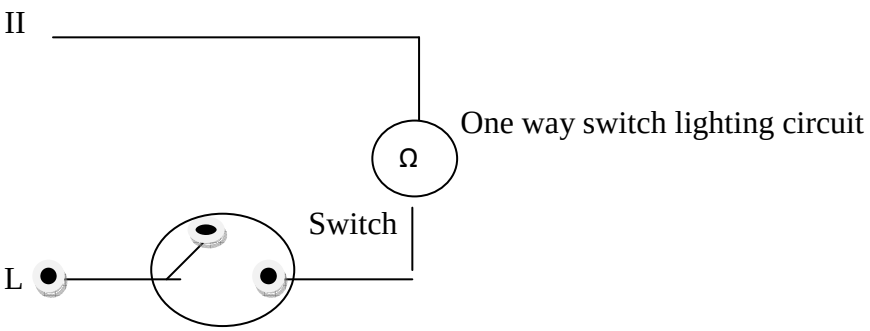
In parallel circuit the connection is such that the same voltage is applied to each component.



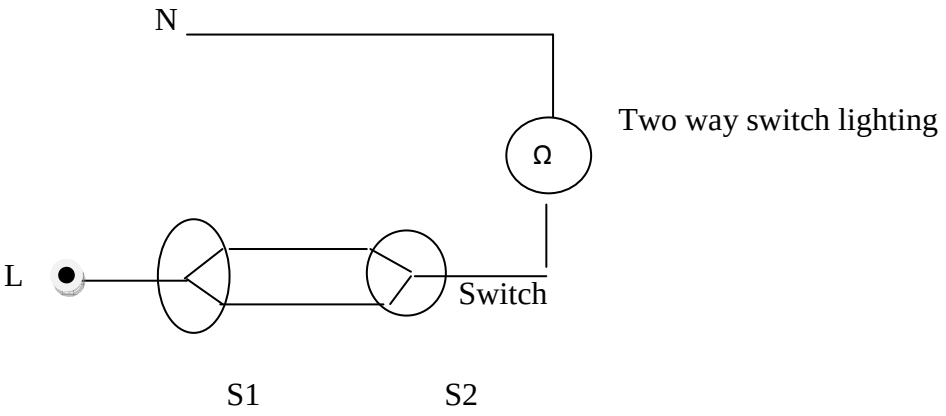
### 2.1.4 Switch Control of Lighting Circuits

Lighting circuit is generally controlled using;

1. Single pole one-way switches. This means that if you put on your light you cannot off it at the opposite side.




2. Single pole two –way switches. This means that you can switch on your light and switch it off at the opposite side ie (vice –versa).




Each component in a parallel circuit receives the same amount of voltage but the total current supplied is shared between the components. This type of circuit is widely used as it is easy to arrange a supply at constant voltage. It is also easy to switch off individual parts of the circuit without affecting the operation of other apparatus connected to the circuit. Table 1 gives the designation and voltage ranges which may be encountered in electrical works in Ghana.

**Table 1: Designation and voltage ranges**

| Designation | Voltage Ranges | Application |
|---|---|---|
| Extra low voltage E.LG.U | 30 V R.M.S. A.C 50 V.D.C. or less | Special lighting circuit bell cct etc |
| Law Voltage (L.V) | 250 or Less | Domestic Installation and small industries installation |
| Medium Voltage (M.V) | 250V – 650 V | Larger Industries and commercial Installations |
| Light Voltage (H.V) | 650 V – 3000 V | Local distribution by supply authorities and distribution in local factories |
| Extra high Voltage (E.H.V) | Over 3000 V | Large scale distribution networks |



**Table 2: Logic of Two - Way Switch**

| Switch Position | | Features | |
|---|---|---|---|
| Switch 1 | Switch 2 | Circuit condition | Lamp |
| 1 | 1 | Circuit Complete | ON |
| 1 | 0 | Circuit to broken | OF |
| 0 | 1 | Circuit broken | OF |
| 0 | 0 | Circuit broken | OF |

Two –way and intermediate switch circuit. This circuit is often used on stairways and halls. This switching system controls lamp from two independent switch positions. This switch provides a way of controlling a lamp form three independent switch positions.

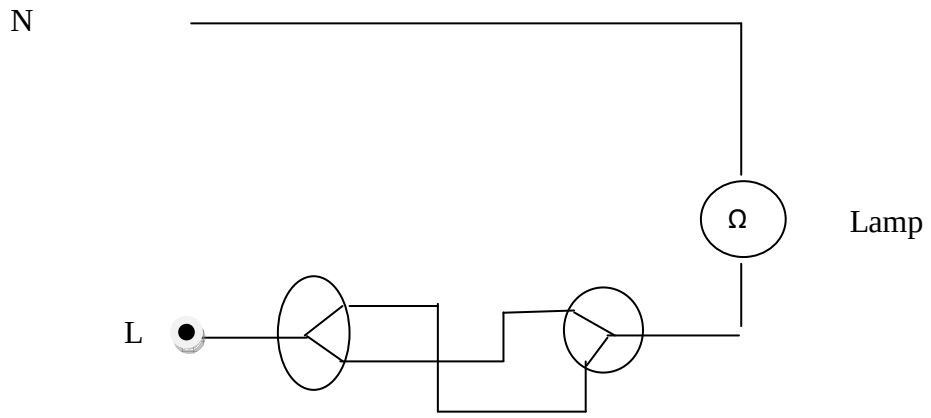



**Table 3: Logic of Intermediate Switch**

| Switch Position | | | Features | |
|---|---|---|---|---|
| Switch 1 | Switch 2 | Switch 3 | Circuit condition | Lamp |
| 1 | 1 | 1 | Circuit Complete | ON |
| 1 | 1 | 0 | Circuit to broken | OF |
| 1 | 0 | 1 | Circuit broken | OF |
| 1 | 0 | 0 | Circuit Complete | ON |
| 0 | 1 | 1 | Circuit Broken | OF |
| 0 | 1 | 0 | Circuit Complete | ON |
| 0 | 0 | 1 | Circuit to Complete | ON |
| 0 | 0 | 0 | Circuit broken | OF |

## 2.2 Causes of hazard due to electrical origin

A shock risk arises whenever accidental contact is made between the live conductor and exposed metal work. This risk can be regarded against either by efficient earthing or, where a good earth is not obtainable by employing voltage operated, earth leakage, circuit breakers. Fire risk in electoral installation can arise in various ways which includes sustained overloading of wiring or equipments, faulty contacts or connections, earth leakage current. It is important not to plug too many things into one flexible extension cord. For most people it is the way to prevent hazard due to electrical origin. There are other courses of electrical hazards that are mostly overlooked by private developer. Wrong application of light fixtures can course electrical accident. For example using 100-Watt bulb in a 60-Watt fixture, this can melt the fixture wire and create shock and fire. Most of the time, this kinds of applications of wrong fixtures are created at the initial stages of wiring a house.

House wiring is one of the leading courses of electrical related of house fires. According to National Fire Protection Association “potential problems with household wiring system can range from overloading circuits to damaged wire to lose connection on switches, outlets and devices”. According to the National Fire Protection Association, “electrical cords and plugs are responsible for the most civilian deaths related to electrical accident each year”. When exposed cable comes into contact with water, potential electrical hazards are shock and fire. Ralph (1982) established a method to estimate the amount of incident energy produced by electrical arcs and the energy threshold to produce a “just curable burn” of human body. His finding paved way for arc flash protection practices in the industry. The United States of America Bureau of Labour Statistics (BLS) data show that 1 to 4 electrical fatalities annually were attributed to electrical burns for 2003-2010. In the construction industry about 57% of electrical injuries are burns. The utility industry has the highest rate of nonfatal electric burn

injuries at 1.6 cases per 10,000 workers in 2010, followed by the construction industry at 0.4 cases. The overall electrical burn rate for private industry is 0.1 cases per 10,000 workers for 2003-2010.

### 2.3 Attitude and learning

People are attracted or repelled to something by their views concerning that thing. What determines whether one will be attracted, get the best and make good representation of an experience is attitude. Attitude is an individual attribute can be developed, influenced and changed over time. Researches' have shown that attitude plays a very vital role in learning processes (Altınok, 2004; Joyce & Farenga, 2000; Osborne et al., 2003; Sabellah, 2010; Anwer, 2012). The learning ability of an individual can be increased by improving such individual's attitude (Depaolo & Mclaren, 2006). Attitude arouses student's interest, stirs participation and consequently achievement (Anwer, 2012). According to Mwamwenda (1995) students' performance in a particular subject is determined by their attitudes not ability to study. A number of studies on students' attitude and academic achievement correlation found in literatures showed positive relationship (Akpınar, Yıldız, Tatar, & Ergin, 2009; Myint & Goh, 2001; Chui-Seng, 2004; Mucherah, 2008).

These studies elicited information such as academic workload, teacher qualification, classroom environments, students' gender, socio-economic status as factors that influences students attitude and hence performance (Myint & Goh, 2001; Chui-Seng, 2004; Mucherah, 2008; Neathery, 1997). Both positive and negative attitude have strong impact on the success of a subject learnt (Mordi, 1991). Negative attitude developed by an individual towards a subject reduces the chances of good performance of such individual in that area Sabellah, (2010). Negative attitude could make a learner actively resist instructions which,

according to Mbugua et al. (2012) causes most failure in schools. Depaolo and Mclaren (2006) observed a strong tie between negative attitudes and poor performance in examination. Similarly and Sabellah (2010) observed that poor achievement may lead to development of poor attitude towards learning. Conversely, good performance breeds positive interest in a particular subject (Aremu, 1998). Understanding of students' attitude is important in supporting their achievement and interest towards a particular discipline (Gul & Arshad, 2012).



**2.4 Electrical installation and safety measures**

The history of electrical installation has no specific dating but towards the end of 19th century, specifically on September 4, 1882. Thomas Edison's Pearl Street generating station ushers in the age of commercial electrical power systems". By the end of the 20th century an increase variety of systems were available for installation in homes setting the stage for widespread commercial use of electricity. In May 2009 edition of Electrical Contractors Magazine and published by Jim Phillips. According to Phillips, "Shortly after Pearl street station was brought online, the next historic event that took place was the first electrical shock from a commercial power system". This event gave birth to modern day electrical safety practices. Electrical shock is not the only hazard posed by electric current, deadly electrical explosion and violent spark could occur, when two current carrying conductors are short circuited or a grounded surface.

Circuit breakers may be used to disconnect automatically a faulty circuit. The over bad tripping characteristics are set by the manufacturer and cannot be altered. The characteristics are such that the circuits –breaker will trip for a small sustained overload but not on harmless transient over-load. The advantage is that faulty circuit can easily be identified; and supply

can be quickly and easily restored when the fault has been cleared. There are many ways of protecting both the installation and the user from risk of electric shock or line which may occur under fault conditions. In general a protective device is designed to disconnect the circuits whenever it detects a fault condition. The I.E.E. Regulations recommend that all circuit operating at a voltage exceeding extra low voltage shall be protected against dangerous earth leakage currents. This may be achieved by completely insulating all parts of the system or double –insulation of appliances or earthing of exposed metal apparatus. The earth terminals of socket outlets and all metal work associated with wiring systems, with certain exception such as cable clips, lamps, caps metal chains for suspending lighting fittings.



It is also desirable to inspect and test the installation at regular intervals so that any serious deterioration of cable, fitting, or earthing arrangement can be detected before serious danger arises. The I. E. E Regulation recommends that tests shall be carried out in the sequence verification of polarity, insulation test and earthing test. Also, the polarity test should be made to ensure that that following are satisfied:

a) All single pole switches should be wired in the non-earthed (live) conductor

b) The outer or screwed, contacts of Edison screw type lamp holders should be connected to the neutral conductor.

c) Socket outlets should be tested to endure that the phase conductor is connected to the terminal marked “L” the neutral conductor is connected to the terminal conductor is connected to the terminal marked “N” and earth continuity conductor is connected to the terminal marked “E”

The I. E. E Regulation recommends that two insulation resistance test should be made to avoid or minimize risk.

1. Insulation resistance test. This test is to ensure that, earth and all none-earth conductors are connected together. This ensures that there are no faults to earth from either the "Live or neutral conductors
2. A further insulation test should be made between the live and neutral conductors to ensure that there are no short circuits in the wiring.



**2.5 The role of regulatory authorities**

In England, compliance with part P of the building regulation act is mandatory to keep both the electrician and the customer safe from electrical hazards. Part P is a section of the building regulation which states that, "Any one carrying out electrical work in a dwelling must ensure that reasonable provision has been made in the design and installation and the installation of the electrical installations in order to protect any person who might use, maintain or alter the electrical installation of the dwelling from fire and injury, including electrical shock". The local authorities in England have the power to ensure that part P of the building regulation is strictly followed. In Ghana, safe electrical installation guidelines are issued on paper but are not enforced, although Ghana Electrical Wiring Regulations, 2011, L.I 2008 specifically provides for issues related to:

i. Who qualifies to undertake electrical wiring in Ghana? Regulation 7 provides that:

*"A person shall not undertake electrical wiring on premises unless that person is satisfied by: (a) a licensed electricity distribution utility; or (b) a recognised person appointed by the energy commission"*

State institutions have a role to play in collaboration with home owners to ensure that professional electrical installation rules are complied with. Any future modification or extensions in the initial installation plan must be updated, home owners should be able to

prove that all electrical installation work meets electrical installation regulation of Ghana, or they will be committing criminal offence.

### 2.6 Training institutions

To maximize the usefulness of technical education, the trainee, staff situation, funding, adequate training facilities and social services must be effectively engaged and exploited (Olunwa, 2007; Sahu, 2008). While staff situation, funding, adequate training facilities and social services may serve as input variables, trainee's performance represents the aftermath of nominal engagement and utilization of these input variables. Although, there is no reliable statistics on manpower demands in technical manpower development in the country (Ekunke, 2008), the projection data available showed that there has been acute shortage on manpower required for self-reliance and national development in the nation (Olaitan, 1996). More so, there has been technical skills gap between the students of technical/vocational education and the industry in the country (Idris, 2012).



Researchers have demonstrated that ineffective and inefficient training of the students reflects in the quality of graduates produced (Dasmani, 2011; Ozoro, 1990). Students gain better understanding and improve their ability to utilize their skills through cognitive, associative and autonomous stages in technical skill acquisition (Anderson, 1995; Gibson, 2011). At the cognitive stage which is the first stage of skill acquisition, the teacher exposes the students to the basic knowledge of handling tools and equipment in execution of a particular task. During this stage the learner develops an in-depth understanding of the skill to be acquired. The second stage of skill acquisition is the associative stage. This is the period of putting into practice those things that has been learnt through a series of project works. While autonomous stage is the final stage where the students accurately execute and finish a

project or task unaided. Improvement on what has been learnt by constant involvement in technical works refines what the students acquire on daily basis (Gibson, 2011).

In spite of the importance and relevance of technical education in training and production of highly skilled, competent and self-reliant middle level manpower for the nation's economic and technological growth, technical education has suffered society apathy since inception which is still not different from what is happening currently (Ozoro, 1982; Odu, 2011). According to Okafor (2011) technical education is a very vital educational sector that is neglected yet it is an inevitable sector that must be embraced in order to make significant progress in terms of national development and job creation. Technical education has long been regarded as education for the poor, mediocre and the undermined (Adesina, 1982; Olaitan, 1996; Odu, 2011; Azubuike, 2011). This gross misconception of the nature and purpose of technical education was postulated as being predominant in developing countries like Ghana. Okocha's (2009) study established that although parents recognize the employment value inherent in technical related courses found in technical/vocational education, they are still prepared to accept the superiority of socially prestigious and white-collar professions over technical related occupations.



Most researches in this area of study explained and emphasized the importance, challenges and ways to improve and revitalize technical education (Ezekiel & Usoro, 2009, Olaitan, 1996, Ozoro, 1982, Ekunke, 2008, Mbata, 2000, Al-Nasra, 2013, Sahu, 2008, Ojimba, 2012). Sahu (2008) classified factors that affect the effectiveness of technical education under seven broad categories as; administration, infrastructure, teaching effectiveness, students, interaction with industry and society, extra-curricular activities, and research and

development. All these factors play crucial role in imparting of specific job-relevant skills for the nation's economic and labour force changes found in technical/vocational education.

There are few found literatures that considered students factors in technical education settings (Azubuike, 2011; Lawal, 2012). While, Lawal's (2012), study observed that students in rural area have higher disposition towards technical education than their counterparts in the urban settings. However in both cases the study revealed that there was disproportionate relationship between students' performance and their interest in technical education. Major influential factors affecting the attitude of students towards technical/vocational subjects observed (Azubuike, 2011). Were interest, gender, socio-economic status, qualification of teachers/instructors and guidance counsellors.



**2.7 Pedagogical training**

Pedagogy is a concept born in the early twentieth century that has to do with teaching relationship to learning. This term was born as an alternative to the 1800's authoritarian education system. The idea was to get rid of dictatorial teachers and instead, trained teachers in progressive methods to become cooperative and caring tutors and not just experts in their subject matter. Basically, this teaching consists on providing skills to educators so as to enhance their guiding and facilitator's capacities (Stone, 2002) Kilpatrik (2006) has a discouraging stand on pedagogical approaches. He claims that such constructive methods, wherein discovery learning takes place, are the least effective processes and that "the most important thing a teacher can give to a student is not self-esteem, or learning skills, or enthusiasm but knowledge" (p.81).

Nevertheless, pedagogical teaching in most cases is considered to be the best practice in the education world. Many educators consider that pedagogical training is more significant than receiving a master's level in the field of education. The reason for this is that teachers believe that "optimal educational outcomes are possible only when the right kind of teaching is used" (Stone, 2002, p. 39). This kind of teaching can only be attained with the formation received in pedagogical teacher training practices. Learner-centered instruction is the key element in pedagogical training; the interests of the learners are placed first allowing the students to grow, maximize their talents, and receive practical, relevant and integrated understanding. The idea is to provide thinking abilities and not merely knowledge.

Stone (2002) presents education as a business wherein consumers and producers debate over their interests, expectations and concerns. "Producers seem to be primarily concerned about how schools operate; whereas consumers are primarily concerned about whether they are producing expected benefits" (Stone, 2002, p.37). There are many factors that interfere in decision-making regarding teacher training programmes such as social, political and economic aspects. Some agents (consumers) want to see results right away whilst others (educators) prefer to get policy makers involved to set up and work on the process. Pedagogical training is very important because it helps teachers become aware of their teaching approach and the methods they implement in their classrooms. Those teachers that received more pedagogical training seemed to use more student-centered approaches and have higher self-efficacy results than those teachers with less pedagogical training (Postareff et al., 2007).

Educators believe that teachers, after being trained, can become self-conscious of the approach they use and its shortcomings. That is, "training makes teachers more aware of

the problems they have in their teaching, and after a longer training process they become more aware of an ideal way to teach" (Postareff et al., 2007, p. 569). Teachers chose their teaching approach according to their personal conception of teaching; if they believe that teaching is about transmitting knowledge they are more likely to use the teacher-centered approach, whereas, those believing that teaching is about facilitating knowledge, often prefer the student-centered approach. The teacher-centered approach is one in which transmitted knowledge is constructed by the teacher, students are seen as passive actors, memorization of facts is enforced, and outcomes are measured with quantitative indicators (Postareff et al., 2007).

Dembele and Miaro, (2003) also present the concept of pedagogical renewal which they refer to a pre-meditated, qualitative change in the educational system consisting of desirable teaching practices. These practices envision student learning and are mainly consisted of participatory, interactive, child-centered, adventurous pedagogy, cooperative learning and inquiry, critical thinking, and problem solving skills. In other words, pedagogical renewal is all about teachers and classroom processes.



**2.8 Training and development**

The two terms are quite identical to each other, but they are not the same in meaning. According to business dictionary, training can be defined as organized activity aimed at imparting information and instruction to improve the recipients performance or to help him or her to attain a require level of knowledge or skill. The encyclopedia defines training as teaching or developing in one self or others any skill or knowledge that relate to specific goal of competences. Training has specific goals of improving one's capability, capacity, productivity and performance. In training emphasis is laid on specific skill set, it relates to

improving specific skill for specific objective. Training form only part of the entire educational process. The concept of training is to help the individual to be abreast with relentless evolving technology which will eventually lead to obsolescence. Training is needed to link organizational, operational and individual and to remove factions within the organization. Training will promote constant upgrading of skill of people, the main objective of organizing a training program for employees is to provide a measure of modification of employee behavior involving complex attitude, skill and understanding and improving organizational effectiveness. Though training is important in organizational structure, it must be geared towards meeting objectives and should not be training for training sake. Several advantages are derived from training employees and they include

1. **increased productivity:** with increase in skill the result is increased in productivity both qualitative and quantitative. Training heightened moral, if individuals are equipped with the requisite skill, they tend out to be confident in discharging their duties, if moral of workers are low productivity is obviously affected, these two are directly proportional.

2. **reduced supervision:** trained employees can worked and performed effectively with little supervision if they are not adequately trained it is not feasible to provide them with an independent working environment.

3. **reduced accident:** if employees are trained and informed about operatives, adequate training in job skill and safety attitude will go a long way to minimize accident rate in the organization.

4. **increased stability and flexibility in the organization:** the ability of the organization to maintain its effectiveness despite the loss of key personnel can be achieved by keeping reservoir of trained replacements.

Development on the other hand is an unfolding process that enables people to progress from a present state of understanding and capability to a future state in which higher level skills, knowledge and competency are required. Development takes the form of learning activities that prepare employee to exercise wider responsibilities. Development does not concentrate on improving performance in the present job. Harrison (2000) defined development as learning experience of any kind, whereby individuals and groups acquire to enhance knowledge, skill, values or behaviors. It is unfold through time rather than immediately and they tend to be long lasting. Employee development seeks to improve the ability of the employees to accomplish additional responsibilities. The significance of training and development should be seen as part of organizational investment in the sense that, human resource is the most important asset of the organization and should be valued as such. Raw human resources can make only limited contribution towards the achievement of organizational goals, the developed human resource can help in the contribution of the organizational growth. The development of human resource is accomplished through training.



The two should interplay for solid organizational structure because there cannot be development without training. Development is futuristic and it is not cost effective for short term programs and does not concern with current issues for this reason organizations have to put development plan in their long term programs. For example organizations have to factor in study leave with pay in their long term development program for employees. Development cannot meet immediate skill supply for the organization in case there are radical technological changes. Development is the growth or realization of a person's ability, through conscious or unconscious learning. Development programmes usually include phases of planned study and experience, and are usually supported by a coaching or counselling facility.

Development occurs when a gain in experience is effectively combined with the conceptual understanding that can illustrate it, giving increased confidence both to act and to perceive how such action relates to its context (Bolton, 1995). According to Becker (1993) there are three types of training or knowledge, which are directly related to rate of return and human capital. Becker specified these trainings or knowledge as investments in human capital. According to Becker (1993) these three types of training or knowledge are:

1. On-the-job training —learning new skills and perfecting old ones while on the job. There are two types of training; a) general training- those skills which are useful in many firms besides those providing it; b) specific training —training that has no effect on the productivity of trainees that would be useful in other firms;
2. Schooling —an institution specializing in the production of training, as distinct from a firm that offers training in conjunction with the production of goods; and
3. Other knowledge- any other information which a person obtains to increase their command of their economic situation.



On-the-job training is intended to improve old skills and provide new skills while employed by a firm. These skills are either transferable or specific. On-the-job training is provided by a firm and utilized to increase the outputs of the firm and to increase the income of the individual. This type of training is valued through the time and effort of the trainees, the teaching provided by others, and the equipment and materials used. These are costs that are incurred from reducing current production in order to increase future production Becker, (1993). On-the-training time periods can vary greatly as more time is spent on an intern than a machine operator (Becker, 1993). General training provides transferable skills to the worker. These types of skills are rarely costly to the firm – most of the trainees bare the cost

of general training and reap the benefits of the returns. Employees pay for the general on-the-job training by receiving wages below what they could receive elsewhere. For example, a mechanist trained in the military receives lower wages than he would in the competitive labour market; however he finds his skill has value in steel or aircraft firms, and a doctor in residency at one hospital finds his skills are highly transferable to other hospitals or private practice in the future. Most general on-the-job training presumably increases the future marginal productivity of the workers in the firm providing the training and in other firms (Becker, 1993).

Specific training refers to training provided by a firm that has limited transferability and only increases productivity within the contextual setting. For example, when a firm hires new employees many times, they are orientated to the culture, specific policies and procedures, and other processes to familiar the new employee with their organization. This type of training is specific because the knowledge acquired raises productivity in the firm providing the knowledge than in other firms. Some specific training may not be useful in a single firm or in most firms, but in a set of firms defined by a product, type of work, or geographical location (Becker, 1993). For example, French legal training would not be very beneficial in the United States, but it would be very useful in France (Becker, 1993).

School training is completed off the job and at an institution that specializes in either one skill or multiple skills. Schools are often substitutions for on-the job training at a firm. This is evidence by the shift in training programs from the firm to the school such as legal apprenticeships to law school, and on-the-job engineering experience to engineering schools (Becker, 1993). Most training programs develop on-the-job than transfer to formal institutions because industry usually sees the value of the training much before schools. Most

schooling costs are absorbed by the student in order to reap the benefits of the returns later from higher wages from specialized skill sets. Training of employees results in increased productivity in any organization. The technological growth of any nation depends on the bulk of trained human resources available (Gary, 2001). Gary (2001) once said manpower is the basic resource, the indispensable means of correcting other resources to mankind's use and benefit. How well we train, develop, and employ the human skill is fundamental in deciding how we will accomplish as organizations. The manner in which we do this will profoundly depend on the kind of nation we have.



According to Becker (1993) workers have the ability to acquire other knowledge from many sources. Other knowledge has the same ability to increase worker wages as on-the-job training, specific and general training, as well as schooling. Information about the prices charged by different sellers would enable a person to buy from the cheapest, thereby raising his command over resources; information about the wages offered by different firms would enable him to work for the firm paying the highest wage. Becker (1993) claims that one of the most influential theoretical concepts in human capital analysis is the distinction between general and specific training or knowledge. The distinction helps explain why workers with highly specific skills are less likely to quit their jobs and are the last to be laid off during business downturns. It also explains why most promotions are made from within a firm rather than through hiring (Becker, 1993). Becker has established the rationale for firms to provide highly specific training to their workers. This type of training reaps benefits for the firm through higher productivity and for the worker through higher wages.

# CHAPTER THREE

# METHODOLOGY

## 3.0 Introduction

This chapter gives details of the methods and procedure of the study. As Merger (1975) puts it, if you do not know where you are going, then you are likely to end up somewhere else. Therefore, by developing a methodology, the researcher will succinctly undertake the study with success in terms of what data to collect, where to collect data, how to collect data, whom to collect data from and how to synthesize data collected in other to draw a good conclusion.

## 3.1 Profile of the Study Area

Tamale Metropolis lies between latitude 9°16' and 9°34' North and longitudes 0°36' and 0°57' West (See Figure 5). It shares common boundaries with Savelugu/Nanton District to the North, Tolon/Kumbungu District to the West, Central Gonja District to the South-West, East Gonja District to the South and Mion Municipality to the East (Tamale Metropolitan Medium Term Development Plan, 2006). Tamale Metropolis occupies approximately 750 $km^2$, which is 13 percent of the total land area of the Northern Region. The Metropolitan Assembly has three Sub-Metropolis namely; Tamale North, Tamale Central and Tamale South. According to the 2010 Population Census, the population of the Tamale Metropolis is 371,351 with male population of 185,995 and female population of 185,356. Dagombas constitute about 80 percent of the total population. The majority of the people in the Metropolis are Muslims.

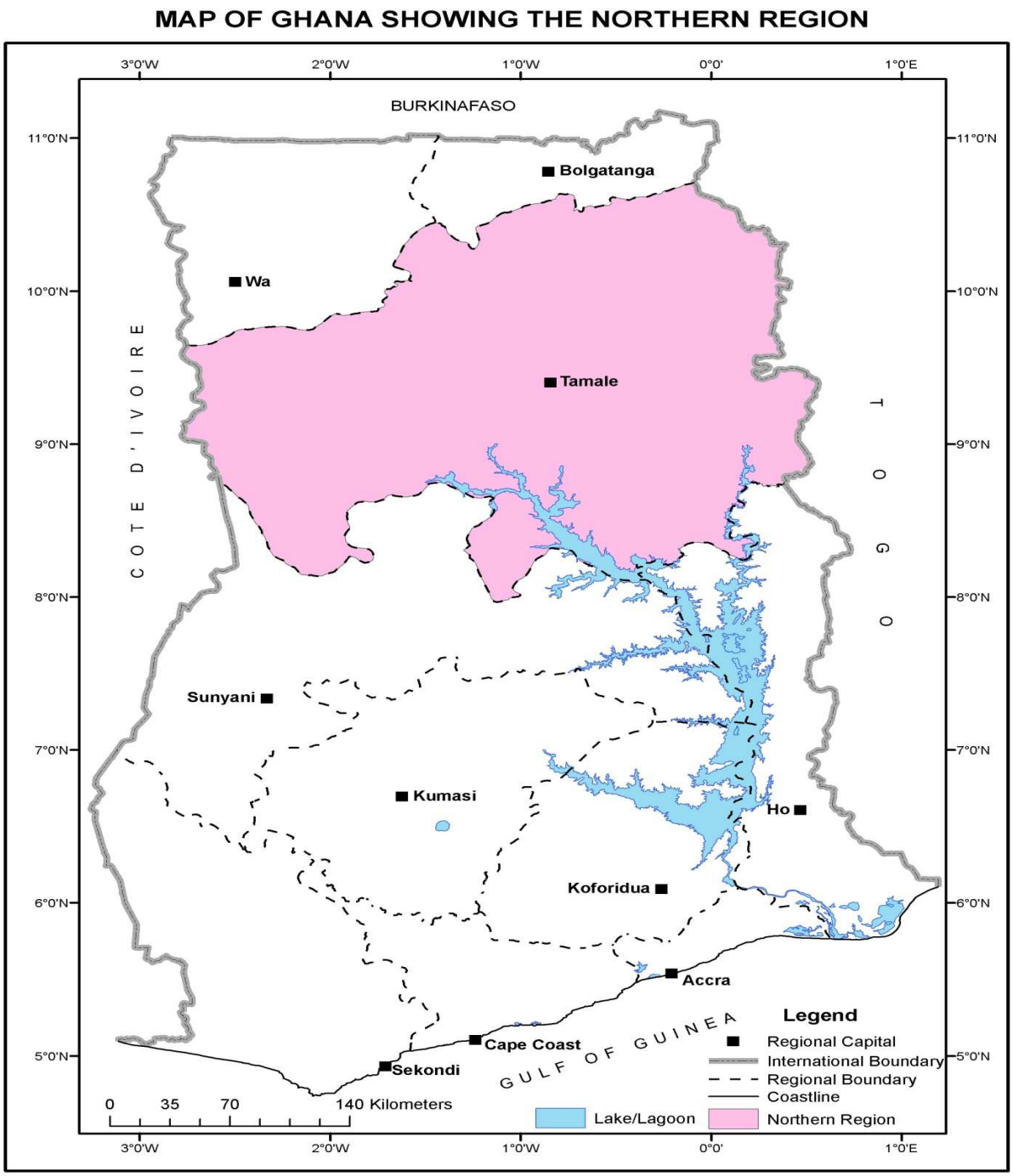



**Figure 5: Map of Ghana showing the Northern Region**

### 3.2 Research design

A research design is a collection of guides or rules of data collection (Adams & Schvaneveldt, 1985; Ogoe, 1993). The research design provides more insight into the practical implementation of the research. Therefore, the research design for this study is an

action research, which embarks on a survey and training of research participants. A survey can collect both quantitative and qualitative data. The action research is a research activity in which the researcher works in collaboration with research participants in order to help solve a perceived problem. It is also an approach which aims at improving upon a problem related to a situation through practical activity. The researcher therefore aims at using activity techniques (e.g., training) in improving upon respondents' understanding of electrical hazards and hazards control measures.



### 3.3 Population of the Study

According to the Ghana Education Service, Tamale Metropolis, there are 49 Junior High Schools. However, there is no available data on the number of electrical artisans because they are not registered or licensed to operate.

### 3.4 Sample and Sampling Techniques

The sample size for the study was 182, which comprised of 120 pupils, 50 parents and 12 electrical artisans. The study used a simple random sampling technique to sample Ahamadiya Junior High Schools in Tamale Metropolis. A simple random sampling technique was done by assigning numbers to the list of all JHS in Tamale Metropolis. The numbers were then folded and put into a box. A child was blind folded to pick randomly one paper. The paper was opened for the school. This was followed by the use of a purposive sampling technique to sample JHS two pupils for the training on electrical hazards and measures of hazard control. Saunders et al. (2003) define purposive sampling technique as "purposive or judgmental sampling enables you to use your judgment to select cases which will best enable you to answer your research question(s) and meet your objectives" (p. 175).

Each pupil's parent was also invited to assist in the identification of electrical artisans. The reason is that parents were in position to inform the researcher the name of the electrical artisan who wired their homes. The artisans were then invited for training on electrical hazards and measures of controlling hazards.



### 3.5 Data Collection Instruments

The main research instruments for the study were exercise, training and a questionnaire.

#### 3.5.1 Exercise

During the period for per-intervention, the researcher gave out exercises to the pupils, parents and electrical artisans. By the use of exercise, the researcher got to know the level of understanding of the causes of electrical hazards and measures of controlling them. The exercises were examined, scored and analyzed.

#### 3.5.2 Questionnaire

A questionnaire enhances consistency of observations and improves replication due to its inherent standardized measurement and sampling techniques (Oppenheim, 2003). Questionnaires elicit more candid and more objective replies. The closed and open-ended questionnaire will be administered to the respondents. The open-ended questionnaires require the respondents to indicate their responses in writing. The preliminary section which included the opening statement and purpose of the study were stated clearly. The main sections of the questionnaire outlined explicitly the instructions on filling/completing the questionnaire. The questionnaire had a Likert scale to measure the perception of respondents on some statements.

### 3.6 Data Collection Procedure

There was a set of measures that the researcher used in order to help solve the identified problem. These included series of concrete measures and approaches.

#### 3.6.1 Situational analysis/Pre-intervention

A pre-intervention was carried out to ascertain the level of the problem. This was done through a questionnaire administration to parents in the Tamale Metropolis. Pre-intervention was conducted with similar respondents to those who were included in the actual survey (de Vaus, 2002). The results of the pre-intervention were presented in Chapter four for the purpose of comparison purpose with the post-intervention. Also, the questionnaires were supported with semi-structured interview guide with electrical artisans.

#### 3.6.2 Intervention

The results of the pre-intervention stage showed the areas that most electrical artisans, parents and pupils lack knowledge and skills in. Therefore, three days capacity building workshop was conducted for the sampled respondents to build their capacities on electrical hazards, identification of hazards and measures of controlling hazards. The specific training tools/techniques to be used during the workshop will include plenary session, brainstorming, facilitation, lectures, discussions and group work. The structure and design are stated in Table 4.



**Table** **cture and design**

| Day | l | Topic | Range | Specific Objective | Content |
|---|---|---|---|---|---|
| Day 1 | | General Health and Safety<br>Training Rationales | • Workshop Safety<br>• Personal Safety<br>• First Aid<br>• Work Environment Safety<br>• Electrical Safety | The electrician will be able to:<br>(1) Identify dangerous situations and behaviors likely to cause accidents | Dangerous situation with respect to:<br>Ladders, hand tool scaffolds contacts with electricity |
| | :15 | **B R E A K** | | | |
| | - | Continue | Continue | Trainee should be able to identify and select suitable projective clothing for specific jobs | Suitable projective clothing<br>i. Goggles<br>ii. Hand gloves<br>iii. Helmet<br>iv. Safety boots Safety belt<br>v. Overall/Overcoat |
| | | | | Demonstrate knowledge of the practical application. | Practical application provision of protective clothing |

| Day | Period | Topic | Range | Specific Objective |
|---|---|---|---|---|
| Day 2 | 8am – 10am | Basic electricity principal | ➢ Ohms law and basic electrical circuits<br>➢ conductors<br>➢ types of insulation | The electrician will be able to: Define and explain the ohms law.<br>Connect resistance in series and parallel and series parallels |
| | 10-10:15 | **B R E A K** | | |
| | 10:15 -12:15 | Cont. | | ▪ Calculate resistance voltage, and current using ohms law.<br>▪ Identify types of conductors, semi conductor and insulators |
| | 12:15-2:15 | **B R E A K** | | |
| | 2:15-3:15 | Cont. | | Classification of voltage phases |

**ACTIV METHOD**

| OBJE | ACTIVITES |
|---|---|
| The e n will:<br><br>1. stand and observe<br><br>al safety rules | i. Exercise: Learning instructional and participatory method<br>The instructor will introduce to the participants the rational of the training.<br>ii. He will we illustration to demonstrate dangerous situation with respect to: Ladders, hand tools scaffolds, contacts with electricity.<br>iii. Dangerous behaviors for example<br>a. Lack of concentration<br>b. Disregard for safe practices<br>c. Laziness<br>d. Impatience<br>e. Indecision<br>f. Complacency<br>iv. The instructor will identify suitable projective clothing and their importance for example Goggles, Hand gloves, Helmets, safety boot, safety belt, overall/overcoat participants will use the last session practice lesions taught. |

| OBJE | ACTIVITES |
|---|---|
| The e n will<br>1. stand and apply ohms law<br>2. ciate voltage<br>fications<br>3. stand use of conductors<br>sulations | Exercise: Learning the insulation method<br>✓ The instructor will use ohm's law to perform basic calculation such as<br>V = I X R where<br>V = Voltage I = Current and<br>R = resistance<br>✓ The instructor will demonstrate connection of resistors in the following modes.<br>1. Resistors in sense<br>2. Resistors in parallel<br>3. Resistors in series parallel<br>✓ The instructor will we sample conductors and insulators for illustration to identify: silicon conductor carbon conductor, Germanium conductor.<br>✓ Classification of single phase voltage (2300), three phase voltage (100) and Tolerance + 10% |

| Day | od | Topic | Range | Specific Objective |
|---|---|---|---|---|
| Day Three | -10am | Cables | • Types<br>• sizes<br>• Current carrying<br>• Capacity<br>• Colour coding | • Identify types of cables |
| | 5 – 10:15 | **S N A C K** | | **B R E A K** |
| | 5 – 12:15 | Count | • Methods of election<br>• Jointing and Termination | • Identity Sizes and current carrying capacity of cable |
| | 5 – 2:15 | **L U N C H** | | **B R E A K** |
| | – 3:15 | Identification of electrical symbols | ➢ Symbols for electrical circuit. | Draw electrical using electrical symbol. |
| | 3:15 – 4:00 | Colour coding | | Identification of colour coding for various cables |

| Day | iod | Topic | Range | Specific Objective |
|---|---|---|---|---|
| Day Four | n-10am | Maintenance | • Routine maintenance<br>• Corrective Maintenance including service and repairs<br>• Trouble shorting | Difference between routine and corrective maintenance<br>Explain trouble shooting |
| | 15 – 2:15 | **B R E A K** | | |
| | 5 – 3:15 | Count | | • Diagnose electrical faults |
| | 0 – 4 :2 0 | Customer relation<br>Electrical wiring regulation 2011, L1 2008 | • Interpersonal skills<br>• Communication skill<br>➢ Qualification requirement<br>➢ Scope of regulation<br>➢ Materials for wiring<br>➢ Offences and penalties etc | Explain inter-personal skills and effective communication<br>• Describe the essential of electrical wring regulation<br>• Apply the provision in the schedules to the electrical wiring<br>• Apply provision of Ghana standards (GS 1002). |

| Objec r Day 3 | Activities |
|---|---|
| The e n will<br>1. gnize cables and sizes<br>2. stand electrical g systems<br>3. stand load outor unit<br>4. gnizes electrical tive devices ling surge arresters<br>5. electrical ing systems<br>6. ciate inspection sting<br>7. stand and apply enance practices | Exercise: The instructor will demonstrate various types of symbols including<br>i. Switch, sockets, fans, cooker bell, heater.<br>ii. The instructor will demonstrate how these symbol can be linked through electrical circuits<br>iii. The instructor will identity different types of electrical circuit diagrams eg Actual, Signal Line, Block, As fitted/ As-built/As-built installed.<br>iv. The instructor will identify different between schematic and wiring diagrams<br>v. Participants will demonstrate by practical means how to identify wiring fault wising diagrams<br>vi. The instructor will demonstrate with different cable diameter $1.5mm^2$ $2.5mm^2$ $4.0mm^2$ $6.0mm^2$ $10.0mm^2$.<br>vii. The instructor will demonstrate with different types of insulation eg. PVC, SWA/PVC cable the instructor: will demonstration the electrician of cable for practices task for example.<br>1. $5mm^2$ is for lighting.<br>2. $5mm^2$ is for socket outlet $4.0\ mm^2$ is for water heater and air conditions<br>$6.0mm^2$ is for cooker<br>$16.mm^2$ is for consumer unit, earthing conductor<br>$16.mm^2$ is also for service mains. |

| Objec r Day 4 | Activities |
|---|---|
| ➢ echnician will:<br>➢ stand the concept intenance the cian will<br>➢ stand electrical regulation 2011, 08<br>➢ provisions of cal wiring tions | Exercise: The instructor will explain the difference between routine and corrective maintenance<br>• The purpose of maintenance<br>• The timing of maintenance<br>• The frequency of maintenance<br>• The effect of maintenance<br>➢ The instructor will explain inter-personal and effective communication skills the skill would be a person to properly interact with others the ability in the areas of language understanding, impuage skills, the importance of interpersonal and communication skills informs of accurate information avoid destructions, and application of types of communication and interpersonal skills<br>Exercise: The instructor will explain and refer to electrical regulation 2011, LI 2008 to participants<br>The applications in the schedule to the electrical wiring regulating in caring out wiring of facilities.<br>The instructor will explain application of provision of Ghana standard (GS 1009) and compliance with the electrical wiring regulations |

### 3.6.3 Post-intervention

As a means of evaluating the effectiveness of the training adopted by the researcher to help respondents identify home electrical hazards, and measures of controlling hazards, exercises will be given again to respondents for scoring and grading. After the exercise, the scores and grade were compared with the pre-intervention stage to see if there was improvement in knowledge and skills in hazards identification and control measures.



### 3.7 Data Analysis and Presentation

The Statistical Package for Social Science (SPSS) was used to analyze the data. Frequency distribution table and percent of the results were presented. The data was also analyzed using the paired-sampled t-test. Means, standard deviations, charts and graphs were also presented.

### 3.8 Data Quality and Ethical Issues

The researcher presented an introductory letter from the University for Development Studies to the respondents to gain their trust and confidence in order to obtain adequate and useful information. The specific ethical issues observed in the study included informed consent, right to anonymity and confidentiality, and right to privacy and justice. Informed consent is "a legal requirement before one can participate in a study" (Brink & Wood, 1998, p. 200). On this basis, respondents were allowed to act independently by giving their informed consent to participate in the study. Prior to the respondents giving consent, the purpose of the study was explained in Dagbani to illiterate electrical artisans and some parents or landlords. The respondents were informed that participation was voluntary and they were free to withdraw should they so wish.

# CHAPTER FOUR

# RESULTS AND DISCUSSION

## 4.0 Introduction

This chapter presents the results of the study based on the objectives of the study. It also sub-developed themes and heading for the presentation of the research findings. It described the data beginning with the demographic characteristics of the respondents and then followed by the research objective in the way and manner they were set in the Chapter one.



## 4.1 Demographic Characteristics of Respondents

Field data was collected from 120 pupils, 50 parents and 12 electrical artisans within the Tamale Metropolis. There was a 100% response rate as the entire questionnaires sent out were successfully administered and retrieved from respondents. Demographic information collected included gender, age, marital status, level of education, and occupation of respondents. Further background information collected from some category of respondents included the position and number of years of work experience. The results obtained from the field on respondents' background are presented as follows:

### 4.1.1 Gender of Respondents

The sex distribution for the respondents obtained from all the categories are indicated in Figure 6. The data obtained shows that 42%, 49% and 100% of pupils, parents and electrical artisans respectively were males while 58% and 51% of pupils and parents, respectively were males. The data clearly shows that females constituted majority among the school visited and whose parents attended and participated in the identification of electrical artisans. The findings of the study also indicate no female was an electrical artisan. This finding suggests and confirms that the electrical artisanship is dominated by male probably due to the risky

nature of the job women do not feel comfortable working there. However, since the study sample was randomly selected the female dominance did not bias the study results.

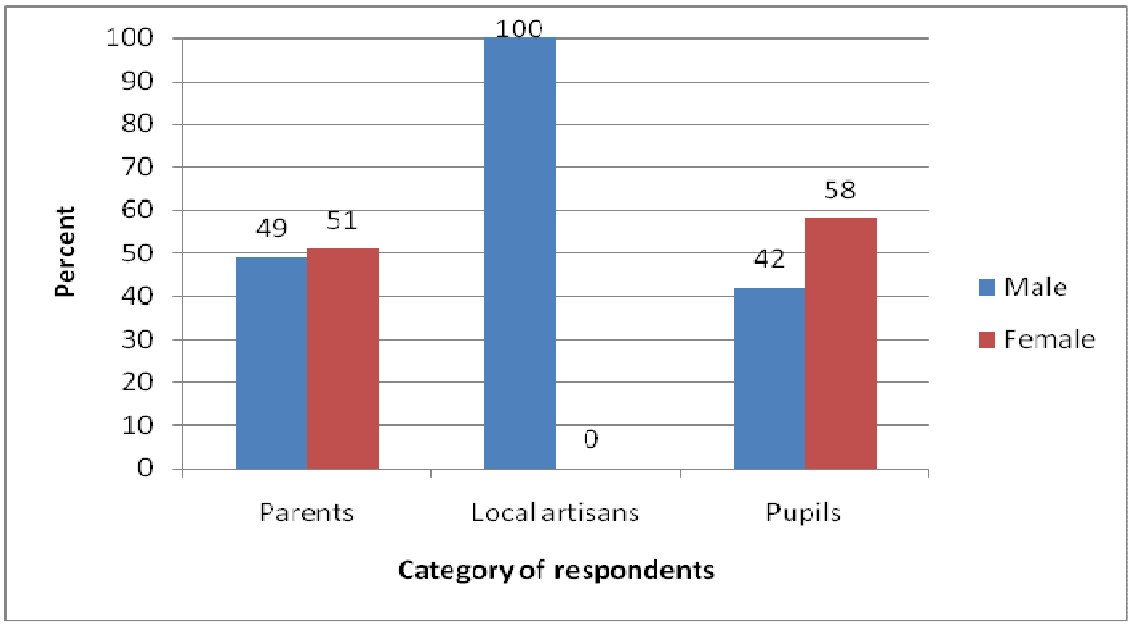



**Figure 6: Gender distribution of respondents**
Source: Field survey, 2017.

### 4.1.2 Age Distribution of Respondents (Local artisans, parents and pupils)

Age is an important social factor in the determination of an individual's perceptions on issues. For the purpose of this study and analysis, the ages of respondents were classified into six categories as follows: Below 26, 26-35, 36-45, 46-55, 56-65 and above 65 years. Table 5 presents the results of age distribution of local artisans, 3 of the local artisans representing 25% of the respondents are below 26 years, 7 local artisans representing 59% of the respondents are between 26-35 years, 1 local artisan representing 8% of the respondents are in age categories of 36-45 years and 46-55 years respectively. The study indicates that majority of the local artisans are in youthful population and may not have acquired long working experience in electrical hazards and safety measures.

**Table 5: Local artisans' age**

| Age Group | Frequency | Percent (%) |
|---|---|---|
| Below 26 | 3 | 25.0 |
| 26 – 35 | 7 | 59.0 |
| 36 – 45 | 1 | 8.0 |
| 46 – 55 | 1 | 8.0 |
| 56 – 65 | 0 | 0.0 |
| Above 65 | 0 | 0.0 |
| Total | 12 | 100.0 |

Source: Field survey, 2017.



**Parents' age**

Table 6 shows the age distribution of parents in the study area. The study also presents that no parent was below 26 years. The results show that only 1 parent representing 2% of the respondents fall within the ages of 26-35 years and above 65 years respectively, 9 parents representing 18% of the respondents fall within the age category of 36-45 years, 37 parents representing 74% of the respondents fall within the age category of 46-55 years and 2 representing 4% of the respondents fall within the category of 56-65 years. The findings of the study also indicate that all the pupils in the study were between 12 and 15 years. The findings of the study indicate that respondents from each of these age groups were capable of understanding the issues raised under the research topic.

**Table 6: Parents' age**

| Age Group | Frequency | Percent (%) |
|---|---|---|
| Below 26 | 0 | 0.0 |
| 26 – 35 | 1 | 2.0 |
| 36 – 45 | 9 | 18.0 |
| 46 – 55 | 37 | 74.0 |
| 56 – 65 | 2 | 4.0 |
| Above 65 | 1 | 2.0 |
| Total | 50 | 100.0 |

Source: Field survey, 2017.

### 4.1.3 Marital status of respondents (Parents, local artisans and pupils)

Figure 7 shows the marital status of the respondents. The analysis of field data obtained on the marital status of respondents showed that 43 parents representing 86% of the parents were married, 5 parents representing 10% of the respondents were single and 2 parents representing 4% of the respondents were divorced. Analysis of the local artisans' marital status indicate that that 6 local artisans representing 50% of the respondents were married, 4 local artisans representing 33% of the respondents were single and 2 local artisans representing 17% of the respondents were divorced. Marital status of the respondents did not have significant Analysis of field data on marital status and perceptions on electrical hazards safety measures shows that there is no significant difference between the perceptions of married respondents from that of the unmarried respondents since in most instances both held similar perceptions on various key variables.



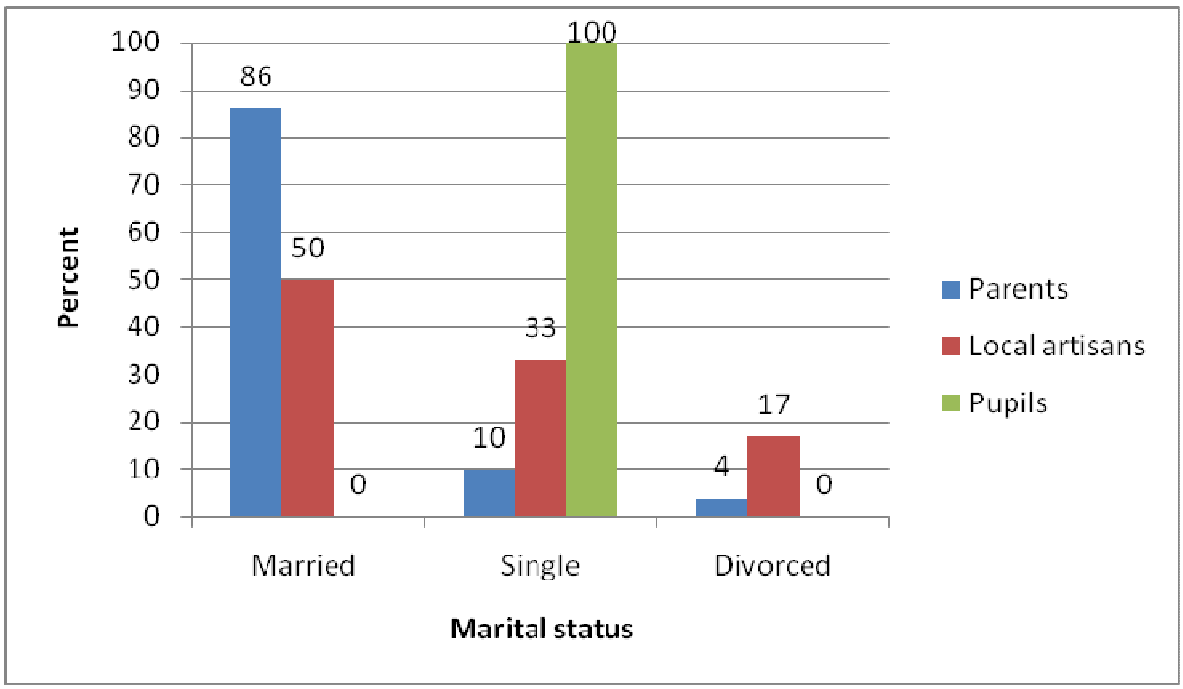



**Figure 7: Marital status of the respondents (Parents and local artisans)**
Source: Field survey, 2017

### 4.1.4 Educational status of the respondents

Figure 8 shows the educational status of the respondents. The findings of the study indicate that 7 parents representing 14% of the respondents had no formal education, 24 parents representing 48% of the respondents had basic education, 9 parents representing 20% of the respondents had Senior High School, 1 parent representing 2% of the respondents had NVTI and 9 parents representing 18% of the respondents had university degrees. With respect to the educational status of local artisans, the findings show that 7 local artisans representing 58% of the respondents had Basic education, 3 local artisans representing 26% of respondents had no formal education, 1 local artisan representing 8% of the respondents had SHS, and 1 local artisan representing 8% of the respondents had NVTI and intermediate education from the Tamale Polytechnic. Furthermore, all the pupils have basic education. The field results on education therefore show that whereas majority of parents and local artisans had basic education.

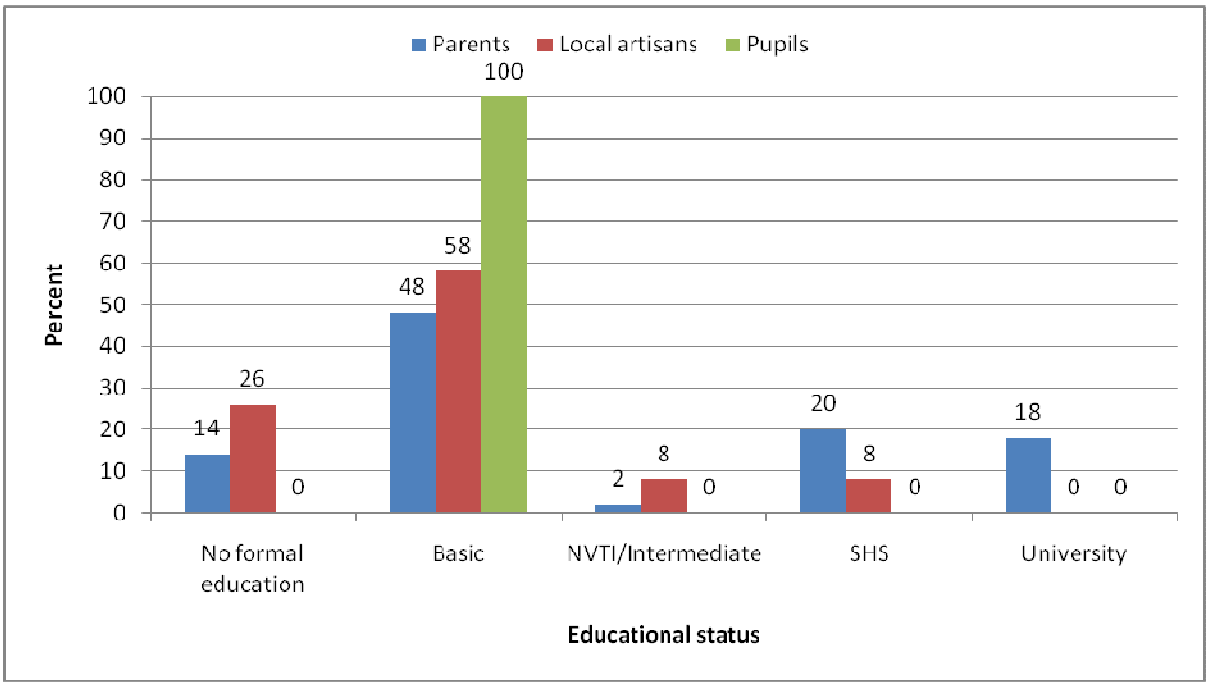



**Figure 8: Educational status**
Source: Field survey, 2017.

### 4.1.5 Major source of livelihood

Table 7 presents the major source of livelihood. The findings indicate that majority of the respondents were students (pupils) who were considered in the study. Also, 18 representing 10% of the respondents were unemployed, 12 representing 7% of the respondents were electricity artisans, 9 representing 5% of the respondents were engaged in by-day as their major source of livelihood and 11 representing 6% of the respondents were engaged in trading. Furthermore, 4 representing 2% and 8 representing 5% of the respondents were engaged in nursing and teaching respectively as their source of livelihood.



**Table 7: Major source of livelihood**

| Sources of livelihood | Frequency | Percent (%) |
|---|---|---|
| Trading | 11 | 6.0 |
| Nursing | 4 | 2.2 |
| Labour/by-day | 9 | 4.9 |
| Teaching | 8 | 4.5 |
| Unemployed | 18 | 9.9 |
| Student | 120 | 65.9 |
| Electrical artisan | 12 | 6.6 |
| **Total** | **182** | **100.0** |

Source: Field Survey, 2017

### 4.1.6 Number of years of working experience of local artisans

Table 8 presents results of the number of years of working experience of local artisan. The study revealed that 3 local artisans representing 25% of the respondents have 1-3 working years, 2 local artisans representing 17% of the respondents have 4-7 years of work

experience. Furthermore, 7 local artisans representing 58% of respondents said that they have above 8 years working experience in electricity.

**Table 8: Number of years working**

| Years | Frequency | Percent (%) |
|---|---|---|
| 1-3 | 3 | 25.0 |
| 4-7 | 2 | 16.7 |
| 8 and above | 7 | 58.3 |
| Total | 12 | 100.0 |

Source: Field survey, 2017.



## 4.2 Pre-intervention knowledge, training and development programmes available to unprofessional local artisans

This section presents findings on the pre-intervention and post-intervention. It specifically presents knowledge of basic electricity terminologies, insulation, electricity circuits, cables, use of projective materials, electricity health and safety measures and training programmes available to local artisans.

### 4.2.1 Knowledge of basic electricity terminologies

Table 9 shows the knowledge of local artisans of basic electricity terminologies. The findings of the study show that none of the local artisan know and comprehends the ohms law. The results also indicate that 1 local artisan representing 8% and 2 local artisans representing 17% of the respondents said that they know electrical circuits and conductors, respectively. The findings suggest that majority (9) local artisans representing 76% of the respondents know insulation.

**Table 9: Knowledge of basic electricity**

| Electricity terms | Frequency | Percent |
|---|---|---|
| Ohms law | 0 | 0.0 |
| Electrical circuits | 1 | 8.3 |
| Conductors | 2 | 16.6 |
| Insulation | 9 | .1 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.



### 4.2.2 Knowledge of insulation

Table 10 shows the knowledge types of insulation by local artisans. The findings show that 4 local artisans representing 33% of the respondents said that they know PVC are used as insulation. The respondents indicate the PVCs are usually used when wiring storey buildings and self-contained houses. Table 10 indicates that 5 local artisans representing 42% of the respondents said that they know cellotape as insulation. Furthermore, 3 local artisans representing 25% of the respondents said that they know polythene/rubber are used as insulation. Generally, the findings suggest that the local artisans know different types of insulation. However, none of the local artisan knows SWA is used for insulation.

**Table 10: Knowledge of types of insulation**

| Types of insulation | Frequency | Percent |
|---|---|---|
| PVC | 4 | 33.3 |
| SWA | 0 | 0.0 |
| Polythene/rubber | 3 | 25.0 |
| Cellotape | 5 | 41.7 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.

### 4.2.3 Knowledge of types of electrical circuits

Table 11 shows the knowledge of types of electrical circuits. The finding shows that only block electrical circuit is known by all the local artisans (100%) in the study area. There is no local artisan sampled for the study with knowledge of actual and signal line electrical circuits. This is probably due to the level of education of the respondents.



**Table 11: Knowledge of types of electrical circuits**

| Electrical circuits | Frequency | Percent |
|---|---|---|
| Actual | 0 | 0.0 |
| Signal line | 0 | 0.0 |
| Block | 12 | 100.0 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.

### 4.2.4 Knowledge of cables used in electrical works

Table 12 presents local artisans' knowledge of cables used in electrical works. The results show that 5 local artisans representing 42% of the respondents said that they know the cables by size, 4 local artisans representing 33% of the respondents said that they know the cables by type, while 1 and 2 local artisans representing 8% and 17% of the respondents said that they know the cables by current carrying capacity and colour coding respectively. The less number of local artisans having knowledge of the current carrying capacity of cables suggest that majority of the artisan may wrongly use low current carrying capacity cable for say a heater or electrical oven which many results in electrical hazards leading to loss of life.

**Table 12: Knowledge of cables**

| Cables by | Frequency | Percent |
|---|---|---|
| Type | 4 | 33.3 |
| Size | 5 | 41.7 |
| Current carrying capacity | 1 | 8.3 |
| Colour coding | 2 | 16.7 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.



### 4.2.5 Use of projective materials

Table 13 presents the use of projective materials in the study area. The results of the study show that none of the respondents use goggles and hand gloves for their personal safety. The findings indicate that 10 local artisans representing 83% of the respondents said that they use overall coats, 1 local artisan representing 8% of the respondents said that they use safety boots and safety belts respectively. The use of safety boots and safety belts is in respect of climbing electricity pools to connect or work on a faulty cable.

**Table 13: Use of projective materials**

| Types | Frequency | Percent |
|---|---|---|
| Goggles | 0 | 0.0 |
| Hand gloves | 0 | 0.0 |
| Safety boots | 1 | 8.3 |
| Safety belts | 1 | 8.3 |
| Overall coats | 10 | 83.4 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.

### 4.2.6 General health and safety measures

Table 14 presents results of health and safety measures. The results of the study show that 1 local artisan representing 8% of the respondents said that the health and safety measures used are first Aid, work environment safety and electrical safety respectively. Furthermore, overwhelming majority (9) local artisans representing 75% of the respondents engage in personal safety as general health and safety measures. However, no local artisans ensure workshop safety and this is a worrying situation because it can lead to hazards and harm.



**Table 14: General health and safety measures**

| Health and safety measures | Frequency | Percent |
|---|---|---|
| Workshop safety | 0 | 0.0 |
| Personal safety | 9 | 75.1 |
| First Aid | 1 | 8.3 |
| Work environment safety | 1 | 8.3 |
| Electrical safety | 1 | 8.3 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.

### 4.2.7 Training and development programmes obtained

Table 15 presents the available training and development programmes available to local artisans. The findings of the study indicate that 8 local artisans representing 67% of the respondents acquired training and development through apprenticeship. Also, 3 local artisans representing 26% of the respondents had trainings from the National Vocational and Training Institute, while 1 local artisan representing 8% of the respondents acquired training and developments through coaching. The findings suggest that majority of the local artisan acquired knowledge and skills through apprenticeship. However, no local artisan acquired

training programmes through seminars/internship programmes, on-the-job/self training and workshop.

**Table 15: Training and development programmes obtained**

| Programme | Frequency | Percent |
|---|---|---|
| Apprenticeship | 8 | 66.7 |
| Coaching | 1 | 8.3 |
| NVTI | 3 | 25.7 |
| Seminars/internship | 0 | 0.0 |
| On-the-job/self training | 0 | 0.0 |
| Workshops | 0 | 0.0 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.



### 4.3 Post-intervention knowledge, training and development programmes

#### 4.3.1 Improvement of knowledge of basic electricity terminologies

Table 16 shows improvement of knowledge of local artisans of basic electricity terminologies. The findings of the study show that the use of project intervention has resulted in the improvement of local artisan's knowledge of ohm law of electricity by 25%. Also, 4 local artisans representing 33% of the respondents said that the use of training models has enhanced respondent's knowledge of electrical circuits and 5 local artisans representing 42% of the respondents said that their knowledge of what constitute conductors has been improved tremendously.

**Table 16: Knowledge of basic electricity**

| Electricity terms | Frequency | Percent |
|---|---|---|
| Ohm's law | 3 | 25.0 |
| Electrical circuits | 4 | 33.3 |
| Conductors | 5 | 41.7 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.



### 4.3.2 Improvement of Knowledge of insulation

Table 17 shows the knowledge types of insulation by local artisans. The findings show that 4 local artisans representing 33% of the respondents said that their knowledge of SWA as an insulation has been developed due to the training programme instituted by the researcher. Moreover, 5 local artisans representing 42% of the respondents said that their knowledge of PVCs as an insulation has been boosted well. The findings indicate 1 and 2 local artisans representing 8% and 17% of the respondents respectively gained knowledge that the use of polythene/rubber and cellotapes are good insulation but should not be overly depended as they can tear resulting in grinding of cables leading to hazards and fire outbreak.

**Table 17: Knowledge of types of insulation**

| Types of insulation | Frequency | Percent |
|---|---|---|
| PVC | 5 | 41.7 |
| SWA | 4 | 33.3 |
| Polythene/rubber | 1 | 8.3 |
| Cellotape | 2 | 16.7 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.

### 4.3.3 Improvement of knowledge of types of electrical circuits

Table 18 shows the knowledge of types of electrical circuits. The finding shows that 7 local artisans representing 58% of the respondents said that their knowledge of actual have been developed and 5 local artisans representing 42% of the respondents said that their knowledge and skills of signal line has been boosted in the study area.



**Table 18: Knowledge of types of electrical circuits**

| Electrical circuits | Frequency | Percent |
|---|---|---|
| Actual | 7 | 58.3 |
| Signal line | 5 | 41.7 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.

### 4.3.4 Improvement of knowledge of cables used in electrical works

Table 19 shows the improvement of local artisans' knowledge of cables used in electrical works. The findings indicate that 4 local artisans representing 33% of the respondents said that there is improvement the type, current carrying capacity and colour coding. This finding is very significant because it will help reduce the hazards associated with the use of wrong cables in wiring.

**Table 19: Knowledge of cables**

| Cables by | Frequency | Percent |
|---|---|---|
| Type | 4 | 33.3 |
| Current carrying capacity | 4 | 33.3 |
| Colour coding | 4 | 33.4 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.

### 4.3.5 Improvement of knowledge of use of projective materials

Table 20 shows improvement of use of projective materials in the study area. The findings show that 3 local artisans representing 25% of the respondents indicate that they have heightened the use of projective materials for their personal safety at work. The projective materials or clothing used include goggles, hand gloves, safety boots and safety belts.



**Table 20: Improvement in the use of projective materials**

| Types | Frequency | Percent |
|---|---|---|
| Goggles | 3 | 25.0 |
| Hand gloves | 3 | 25.0 |
| Safety boots | 3 | 25.0 |
| Safety belts | 3 | 25.0 |
| **Total** | **12** | **100.0** |

Source: Field survey, 2017.

### 4.3.6 Post-intervention training and development

Table 21 shows the training and development programmes of local artisans received through the intervention. The findings show that 8 local artisans representing 30% of the respondents acquired training and development through apprenticeship, 3 local artisans representing 11% of the respondents had trainings from the National Vocational and Training Institute, while 4 local artisans representing 15% of the respondents acquired training and developments through coaching, seminars/internship, on-the-job/self training and workshop, respectively. This means that the programme intervention introduced by the researcher has enhanced the knowledge and skills of participants on electrical hazards and safety measures.

**Table 21: Post-intervention training and development programmes of local artisans**

| Programme | Frequency | Percent |
|---|---|---|
| Apprenticeship | 8 | 29.7 |
| Coaching | 4 | 14.8 |
| NVTI | 3 | 11.1 |
| Seminars/internship | 4 | 14.8 |
| On-the-job/self training | 4 | 14.8 |
| Workshops | 4 | 14.8 |
| **Total** | **27** | **100.0** |

Source: Field survey, 2017. Multiple responses



### 4.3.7 Perception of the effectiveness of training programmes

Figure 9 shows respondents' perception of the effectiveness of training programmes used by the researcher. The findings of the study indicate that 71% of the respondents said that the training programmes used to impact knowledge and skills to the pupils was excellent, 9% of the respondents said that the programmes are very good, 18% of the respondents also indicated that the training programmes was good. Furthermore, the findings indicate very negligible 2% of the respondents indicate that the training programmes used was fairly good.


**Figure 9: Perception of training programmes**
Source: Field survey, 2017.



### 4.4 Pre-intervention attitudes of parents and pupils towards electricity and electrical appliance

This section presents parents and pupils use of electrical gadgets and appliances in homes, workplace and schools.

#### 4.4.1 Number of sockets present in a room

Table 22 presents the findings of the number of sockets present in rooms of respondents. The results of the study indicate that 106 respondents representing 62% said that they have one socket in their rooms. This implies that gadgets including fridges, television sets, radio, mobile phone charging among other depend on the single socket which can have diverse consequences on the current flow to all the aforementioned gadgets leading to fire outbreaks. Also, the results presented show that 63 respondents representing 37% indicated that they have 2 sockets in their rooms while 1 respondents representing a half percent indicating that

he has 1 socket in his room. The results further show that no respondent had 4 and more socket in the room suggesting majority of homes do not really have many sockets.

**Table 22: Number of sockets per room in the study area**

| Number of sockets | Frequency | Percent |
|---|---|---|
| 1 | 106 | 62.4 |
| 2 | 63 | 37.1 |
| 3 | 1 | 0.5 |
| 4 and above | 0 | 0.0 |
| **Total** | **170** | **100.0** |

Source: Field survey, 2017.



### 4.4.2 Attitude of parents and pupils towards exposed cables

Figure 10 shows the response to exposed cables in the rooms. The results of the study indicate that 93 respondents representing 55% reveal that their homes have exposed cables while 77 respondents representing 45% said that there are no exposed cables in their homes. The findings of the study suggest that parents and pupils have poor attitude to exposed cables which can increase the number of cases of fire outbreaks in the study area.

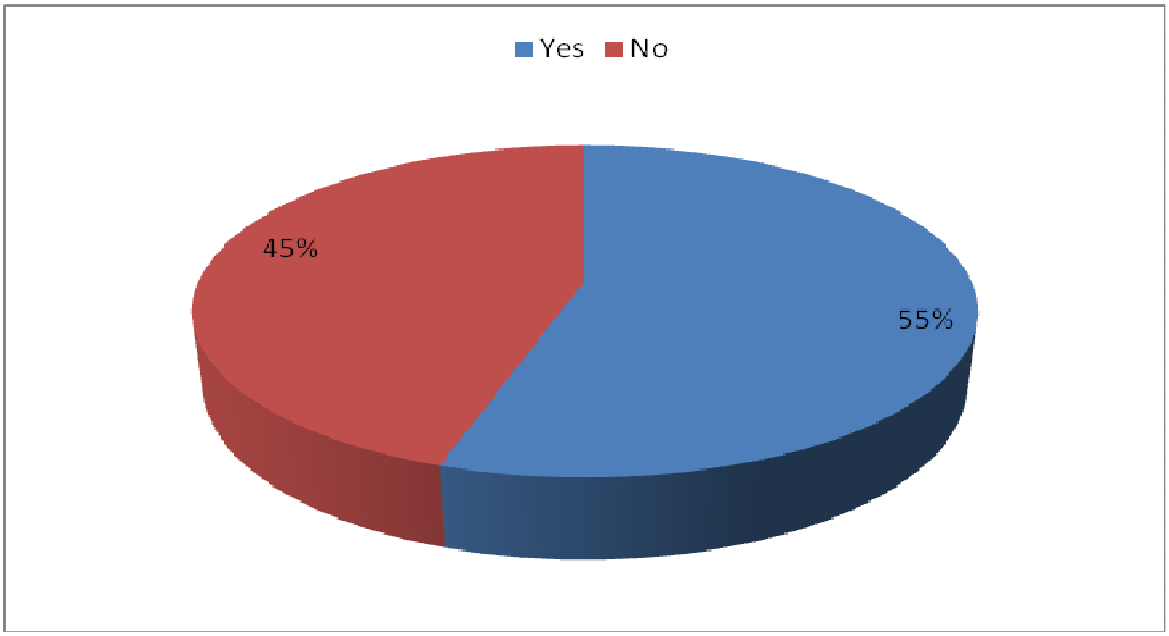



**Figure 10: Attitude towards exposed cables in home**
Source: Field survey, 2017.



### 4.4.3 Availability of fire safety measures in homes

Figure 11 shows the availability of fire safety measures in the study area. The results of the study reveal that 157 respondents representing 92% indicate that there is no fire safety measures in their homes. On the contrary, the results show that 13 respondents representing 8% reveal that there are some few safety measures in the home of the respondents. The finding suggests that majority of parents and pupils have weak attitude towards their safety of homes and properties since there is low available fire safety measures.

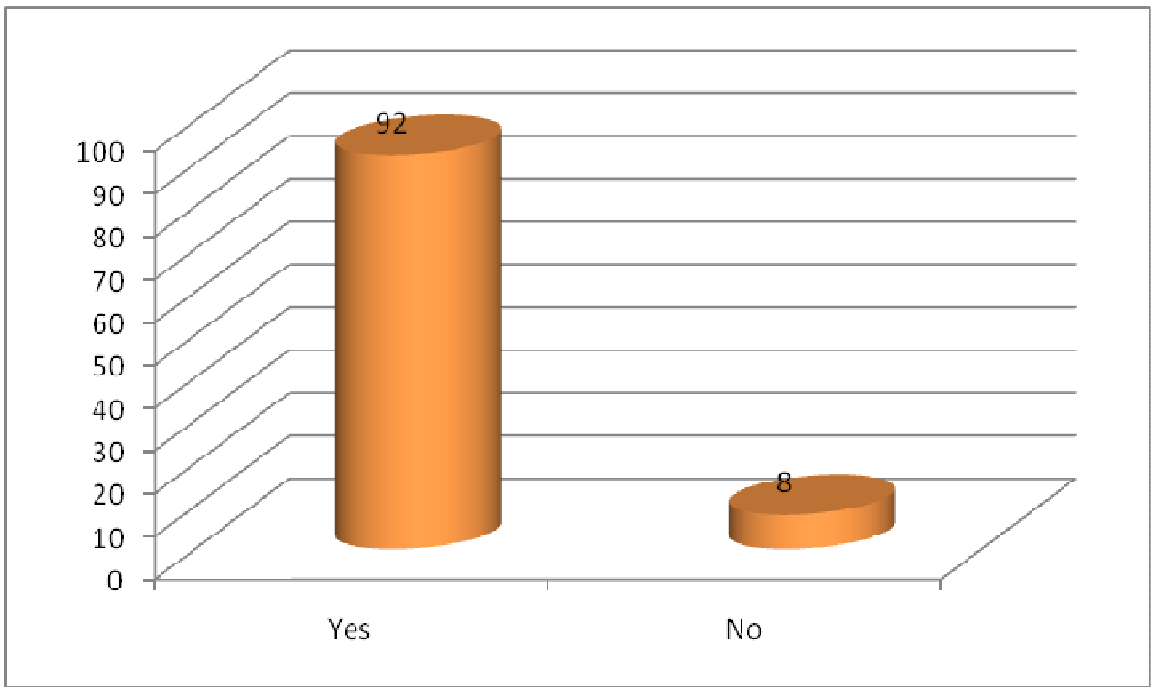



**Figure 11: Availability of safety measures in homes**
Source: Field survey, 2017.



### 4.4.4 Use of professional electrical artisans

Figure 12 presents the responses on the use of professional electrical artisans in the study area. The findings of the study show that almost all the respondents 163 representing 96% indicate that they do not use professional electrical artisans to work on their electricity needs while only 7 respondents representing 4% said that the use professional electrical artisans working with the Volta River Authority for their electrical needs and services.

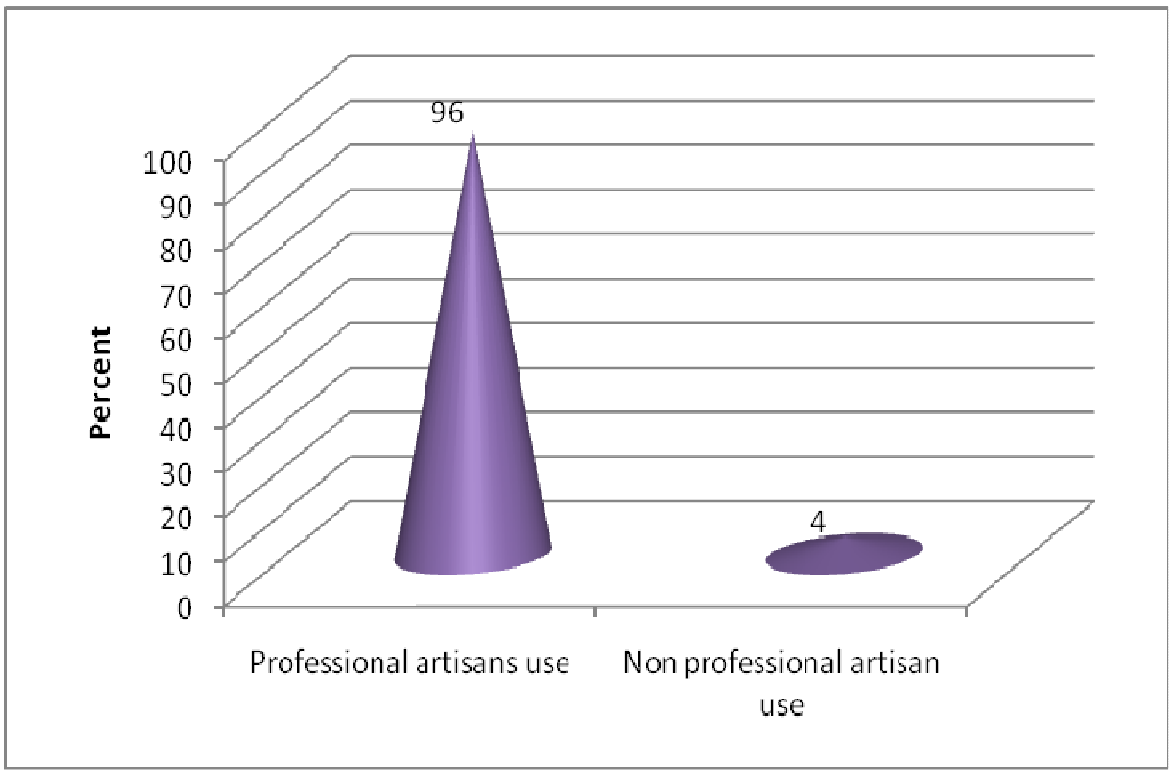



**Figure 12: Use of electrical artisan**

Source: Field survey, 2017.

## 4.5 Post-intervention perception of changes of parents and pupils towards electrical gadgets and appliance use

### 4.5.1 Perception of change in number of sockets per room

Table 23 presents the findings of respondents' perception of change in the number of sockets per room. The findings of the study show that results of the study indicate that 78 respondents representing 46% said that they will increase the number of sockets per room to 2. Also, the results indicate 52 respondents representing 31% indicated that they will increase the number of sockets in per room to 3 sockets while 40 respondents representing 24% said that they will increase the number of sockets per room to 4 and more. The findings also indicate that none of the respondents would maintain one socket per room (Table 1). This means that the majority of the respondents comprehend from the training programmes developed that fewer

sockets could be a source of electrical fire outbreak especially so if it is overloaded with electrical gadgets.

**Table 23: Number of sockets per room in the study area**

| Number of sockets | Frequency | Percent |
|---|---|---|
| 1 | 0 | 0.0 |
| 2 | 78 | 45.9 |
| 3 | 52 | 30.6 |
| 4 and above | 40 | 23.5 |
| **Total** | **170** | **100.0** |

Source: Field survey, 2017.



### 4.5.2 Perception of parents and pupils attitude towards exposed cables

Table 24 shows perception of respondents' attitude towards exposed cables in the rooms. The results of the study indicate that all the respondents (100%) indicate that they will ensure that all exposed electrical cables will be reported and appropriately covered to prevent grindings and spark fire causing electrical hazards and loss of human life and properties.

**Table 24: Perception of parents and pupils towards exposed cables**

| Perception of attitude | Frequency | Percent |
|---|---|---|
| Will report exposed cable | 0 | 0.0 |
| Will not report exposed cable | 78 | 45.9 |
| **Total** | **170** | **100.0** |

Source: Field survey, 2017.

### 4.5.3 Perception of provision of fire safety measures in homes

Table 25 shows perception of respondents' perception of the provision of fire safety measures in homes. The findings of the study indicate that 84 of the respondents representing 49% indicate that they will install fire safety measures in their homes because of the importance of fire safety measure education received from the training programme. Some of the fire safety measures include fire detects alarm bells, fire extinguishers, etc.



**Table 25: Perception of provision of fire safety measures**

| Perception of provision of fire safety measure | Frequency | Percent |
|---|---|---|
| Will install | 84 | 49.4 |
| Will not install | 86 | 50.6 |
| **Total** | **170** | **100.0** |

Source: Field survey, 2017.

### 4.5.4 Perception of future use of electrical artisans

Table 26 presents perception of respondents' future use of electrical artisans in the study area. The results indicate that 44 respondents representing 26% said that they will engage the use of professional electrical artisans compared to 126 respondents representing 74% who said that they will not engage professional electrical artisans probably due to the cost involved in engaging the services of professional electrical artisan. Another reason for the non use of professional electrical artisan is because there is no registered association or body known as professional electrical artisans in the Tamale Metropolis.

**Table 26: Perception of type of electrical artisan to use for future projects**

| Perception of type of artisan | Frequency | Percent |
|---|---|---|
| Use professional | 44 | 25.9 |
| Will not use professional | 126 | 74.1 |
| **Total** | **170** | **100.0** |

Source: Field survey, 2017.



### 4.6 Use of pedagogical training to reduce electrical hazards in homes and schools

This section presents the types of pedagogical training that can be used to reduce electrical hazards in homes and schools in the Tamale Metropolis. It discusses the kinds/types of pedagogica taining programmes and the impact of the most widely used pedagogical training programmes.

#### 4.6.1 Kinds/types of pedagogical training programmes

Table 27 shows the kinds of pedagogical training. The results of the study indicate that 67 of all the category of respondents (parents, teachers, local artisans and pupils) representing 37% perceived the use of child-centered methodology of teaching pupils to help reduce electrical hazards in both homes and schools. Pedagogical training is very important because it helps teachers become aware of their teaching approach and the methods they implement in their classrooms. Those teachers that received more pedagogical training seemed to use more student-centered approaches and have higher self-efficacy results than those teachers with less pedagogical training (Postareff et al., 2007). Educators believe that teachers, after being trained, can become self-conscious of the approach they use and its shortcomings. Teachers chose their teaching approach according to their personal conception of teaching; if they believe that teaching is about transmitting knowledge they are more likely to use the teacher-

centered approach, whereas, those believing that teaching is about facilitating knowledge, often prefer the student-centered approach.

Also, 54 respondents representing 30% indicate the use of cooperative learning and inquiry as the best pedagogical training programmes to teach pupils on the hazards and safety measure of electricity. Furthermore, 18 respondents representing 10% said that the use of problem solving can be used to teach pupils on electrical hazards and safety measures. However, the use of the interactive lecture method was the least methodology proposed by the respondents for the teaching of pupils. Furthermore, 15 respondents representing 8% said that the use of critical thinking is useful for teaching pupils on electrical hazards. Critical pedagogy can empower pupils and teachers. Many see critical pedagogy as an eye-opener, as a tool to broader teachers and pupils' horizon and a way to see who they are and who they want to become. Critical pedagogy makes pupils aware and alert so they can challenge other pupil's opinion. It is believed that creativity on safety measures arise from critical pedagogy.



**Table 27: Kinds/types of pedagogical training for pupils**

| Kinds/types | Frequency | Percent |
|---|---|---|
| Teacher-centered approach | 9 | 4.9 |
| Interactive lecture | 3 | 1.6 |
| Adventurous pedagogy | 16 | 8.8 |
| Child-centered | 67 | 36.8 |
| Cooperative learning and inquiry | 54 | 29.7 |
| Critical thinking | 15 | 8.2 |
| Problem solving | 18 | 10.0 |
| Total | 182 | 100.0 |

Source: Field survey, 2017.

### 4.6.2 Perceived impact of child-centered training methods

Table 28 presents the perceived impact of using child-centered training methods. The results of the study indicate that 66% and 57% of the respondents said that the use of child-centered method is very high in teaching pupils about electrical hazards and safety measures. Also, 17% and 10% of the respondents said that the use of child-centered method is very high in gender senstitivity and socialization which enhances comprehension of electrical hazards and safety measures.



**Table 28: Impact of child-centered method of teaching**

| | Respondents' rating | | | | | |
|---|---|---|---|---|---|---|
| **Impact** | **Very high** | **High** | **Moderate** | **Low** | **Very low** | **Total** |
| | **%** | **%** | **%** | **%** | **%** | **%** |
| Socialization | 10 | 11 | 69 | 8 | 2 | 100.0 |
| Competition | 9 | 34 | 48 | 6 | 3 | 100.0 |
| Gender sensitivity | 17 | 25 | 38 | 17 | 3 | 100.0 |
| Self-efficacy | 66 | 20 | 9 | 4 | 1 | 100.0 |
| Effective monitoring | 57 | 21 | 14 | 4 | 4 | 100.0 |

Source: Field survey, 2017.

### 4.7 Challenges hindering the effective implementation of training programmes

Generally, the major challenge hindering the implementation of the training programmes was the inadequate time to monitor the trainees behavior after the intervention. Furthermore, the time of training of pupils corresponded with their final BECE exams which made some of the final year students unable to participate in the training programmes. Moreover, the local electrical artisans, majority of whom were self-employed also engaged in farming and thus

most of them excused themselves to attend to farms and others who had wiring services to do equally excused themselves.

The penultimate challenge is that the mode of teaching most of the parents and local electrical hazards was in Dagbani which was a problem since the researcher did not understand the language. This language barrier also slowed that the training delivery as the researcher engaged an interpretation which further delayed the training process. Finally, the cost of acquiring all the teaching and learning materials was so huge that the researcher had to improvised some of the materials. The improvised materials did not really represent the ideas the researcher sought to explain to the trainees. This situation therefore undermined the training outcomes.



# CHAPTER FIVE

# SUMMARY, CONCLUSION AND RECOMMENDATIONS

## 5.0 Introduction

This chapter presents the summary, conclusion and recommendations of the study. The summary gives a brief presentation of the major findings of the study. The made a concise conclusion and made recommendations based on the study conclusion.



## 5.1 Summary

### Socio-demographic characteristics of the study respondents

The data clearly shows that females constituted majority among the school visited and whose parents attended and participated in the identification of electrical artisans. The findings of the study also indicate no female was an electrical artisan. This finding suggests and confirms that the electrical artisanship is dominated by male probably due to the risky nature of the job women do not feel comfortable working there. The results of age distribution of local artisans, 3 of the local artisans representing 25% of the respondents are below 26 years, 7 local artisans representing 59% of the respondents are between 26-35 years, 1 local artisan representing 8% of the respondents are in age categories of 36-45 years and 46-55 years respectively. The study indicates that majority of the local artisans are in youthful population and may not have acquired long working experience in electrical hazards and safety measures. The analysis of field data obtained on the marital status of respondents showed that 43 parents representing 86% of the parents were married, 5 parents representing 10% of the respondents were single and 2 parents representing 4% of the respondents were divorced. Analysis of the local artisans' marital status indicate that that 6 local artisans representing 50% of the respondents were married, 4 local artisans representing 33% of the respondents were single and 2 local artisans representing 17% of the respondents were divorced.

The findings of the study indicate that 7 parents representing 14% of the respondents had no formal education, 24 parents representing 48% of the respondents had basic education, 9 parents representing 20% of the respondents had Senior High School, 1 parent representing 2% of the respondents had NVTI and 9 parents representing 18% of the respondents had university degrees. With respect to the educational status of local artisans, the findings show that 7 local artisans representing 58% of the respondents had Basic education, 3 local artisans representing 26% of respondents had no formal education, 1 local artisan representing 8% of the respondents had SHS, and 1 local artisan representing 8% of the respondents had NVTI and intermediate education from the Tamale Polytechnic.

The findings indicate that majority of the respondents were students (pupils) who were considered in the study. Also, 18 representing 10% of the respondents were unemployed, 12 representing 7% of the respondents were electricity artisans, 9 representing 5% of the respondents were engaged in by-day as their major source of livelihood and 11 representing 6% of the respondents were engaged in trading. Furthermore, 4 representing 2% and 8 representing 5% of the respondents were engaged in nursing and teaching respectively as their source of livelihood. The study revealed that 3 local artisans representing 25% of the respondents have 1-3 working years, 2 local artisans representing 17% of the respondents have 4-7 years of work experience. Furthermore, 7 local artisans representing 58% of respondents said that they have above 8 years working experience in electricity.

**Pre-intervention results of knowledge, training and development programmes for local electricity artisans**

The findings show that 4 local artisans representing 33% of the respondents said that they know PVC are used as insulation. The respondents indicate the PVCs are usually used when wiring storey buildings and self-contained houses. Furthermore, 3 local artisans representing 25% of the respondents said that they know polythene/rubber are used as insulation. Generally, the findings suggest that the local artisans know different types of insulation. However, none of the local artisan knows SWA is used for insulation.

The finding shows that only block electrical circuit is known by all the local artisans (100%) in the study area. There is no local artisan sampled for the study with knowledge of actual and signal line electrical circuits. This is probably due to the level of education of the respondents. The results show that 5 local artisans representing 42% of the respondents said that they know the cables by size, 4 local artisans representing 33% of the respondents said that they know the cables by type, while 1 and 2 local artisans representing 8% and 17% of the respondents said that they know the cables by current carrying capacity and colour coding respectively.

The results of the study show that none of the respondents use goggles and hand gloves for their personal safety. The findings indicate that 10 local artisans representing 83% of the respondents said that they use overall coats, 1 local artisan representing 8% of the respondents said that they use safety boots and safety belts respectively. The results of the study show that 1 local artisan representing 8% of the respondents said that the health and safety measures used are first Aid, work environment safety and electrical safety respectively.

Furthermore, overwhelming majority (9) local artisans representing 75% of the respondents engage in personal safety as general health and safety measures.

**Post-intervention knowledge, training and development programmes**

The findings of the study show that the use of project intervention has resulted in the improvement of local artisan's knowledge of ohm law of electricity by 25%. Also, 4 local artisans representing 33% of the respondents said that the use of training models has enhanced respondent's knowledge of electrical circuits and 5 local artisans representing 42% of the respondents said that their knowledge of what constitute conductors has been improved tremendously. The findings show that 4 local artisans representing 33% of the respondents said that their knowledge of SWA as an insulation has been developed due to the training programme instituted by the researcher. Moreover, 5 local artisans representing 42% of the respondents said that their knowledge of PVCs as an insulation has been boosted well. The findings indicate 1 and 2 local artisans representing 8% and 17% of the respondents respectively gained knowledge that the use of polythene/rubber and cellotapes are good insulation.



The finding shows that 7 local artisans representing 58% of the respondents said that their knowledge of actual have been developed and 5 local artisans representing 42% of the respondents said that their knowledge and skills of signal line has been boosted in the study area. The findings indicate that 4 local artisans representing 33% of the respondents said that there is improvement the type, current carrying capacity and colour coding. The findings show that 3 local artisans representing 25% of the respondents indicate that they have heightened the use of projective materials for their personal safety at work. The projective materials or clothing used include goggles, hand gloves, safety boots and safety belts.

**Post-intervention training and development**

The findings show that 8 local artisans representing 30% of the respondents acquired training and development through apprenticeship, 3 local artisans representing 11% of the respondents had trainings from the National Vocational and Training Institute, while 4 local artisans representing 15% of the respondents acquired training and developments through coaching, seminars/internship, on-the-job/self training and workshop, respectively. The findings of the study indicate that 71% of the respondents said that the training programmes used to impact knowledge and skills to the pupils was excellent, 9% of the respondents said that the programmes are very good, 18% of the respondents also indicated that the training programmes was good. Furthermore, the findings indicate very negligible 2% of the respondents indicate that the training programmes used was fairly good.

**Pre-intervention attitudes of parents and pupils towards electricity and electrical appliance**

The results of the study indicate that 106 respondents representing 62% said that they have one socket in their rooms. Also, the results presented show that 63 respondents representing 37% indicated that they have 2 sockets in their rooms while 1 respondents representing a half percent indicating that he has 1 socket in his room. The results further show that no respondent had 4 and more socket in the room suggesting majority of homes do not really have many sockets. The results of the study indicate that 93 respondents representing 55% reveal that their homes have exposed cables while 77 respondents representing 45% said that there are no exposed cables in their homes. The results of the study reveal that 157 respondents representing 92% indicate that there is no fire safety measures in their homes. On the contrary, the results show that 13 respondents representing 8% reveal that there are some few safety measures in the home of the respondents. The findings of the study show that

almost all the respondents 163 representing 96% indicate that they do not use professional electrical artisans to work on their electricity needs while only 7 respondents representing 4% said that the use professional electrical artisans working with the Volta River Authority for their electrical needs and services.



**Post-intervention perception of changes of parents and pupils towards electrical gadgets and appliance use**

The findings of the study show that results of the study indicate that 78 respondents representing 46% said that they will increase the number of sockets per room to 2. Also, the results indicate 52 respondents representing 31% indicated that they will increase the number of sockets in per room to 3 sockets while 40 respondents representing 24% said that they will increase the number of sockets per room to 4 and more. The results of the study indicate that all the respondents (100%) indicate that they will ensure that all exposed electrical cables will be reported and appropriately covered to prevent grindings and spark fire causing electrical hazards and loss of human life and properties. The findings of the study indicate that 84 of the respondents representing 49% indicate that they will install fire safety measures in their homes because of the importance of fire safety measure education received from the training programme.

The results indicate that 44 respondents representing 26% said that they will engage the use of professional electrical artisans compared to 126 respondents representing 74% who said that they will not engage professional electrical artisans probably due to the cost involved in engaging the services of professional electrical artisan. The results of the study indicate that 67 of all the category of respondents (parents, teachers, local artisans and pupils) representing 37% perceived the use of child-centered methodology of teaching pupils to help reduce

electrical hazards in both homes and schools. Also, 54 respondents representing 30% indicate the use of cooperative learning and inquiry as the best pedagogical training programmes to teach pupils on the hazards and safety measure of electricity. Furthermore, 18 respondents representing 10% said that the use of problem solving can be used to teach pupils on electrical hazards and safety measures. However, the use of the interactive lecture method was the least methodology proposed by the respondents for the teaching of pupils. Furthermore, 15 respondents representing 8% said that the use of critical thinking is useful for teaching pupils on electrical hazards.



The results of the study indicate that 66% and 57% of the respondents said that the use of child-centered method is very high in teaching pupils about electrical hazards and safety measures. Also, 17% and 10% of the respondents said that the use of child-centered method is very high in gender senstitivity and socialization which enhances comprehension of electrical hazards and safety measures. The time of training of pupils corresponded with their final BECE exams which made some of the final year students unable to participate in the training programmes. Moreover, the local electrical artisans, majority of whom were self-employed also engaged in farming and thus most of them excused themselves to attend to farms and others who had wiring services to do equally excused themselves. Language barrier also slowed that the training delivery as the researcher engaged an interpretation which further delayed the training process.

### 5.2 Conclusion

The main purpose of the study was to explore the impact of pedagogical training on the reduction of electrical hazards in homes and schools. This study purpose has been achieved through empirical evidence. The study has therefore, augmented the understanding of the

roles of pedagogical training in minimizing the effects of electrical hazards. It is assumed that policy makers and development practitioners who found this study useful will take measure to formulate policies on how to curb and control electrical hazards. The use of formal education network such as National Vocational Training Institute (NVTI) provides enough capacity building and technical support to electricity technicians and this is worthy of note



### 5.3 Recommendations

Based on the finding of the study, the following recommendations are made:

Firstly, there should be a policy which ensures that all homes, schools and offices are given to professionally trained and licensed artisan who will ensure compliance on safety measures are followed. Secondly, there should be a regulatory body to give license, certification and approval to individuals so that they market can be regulated of unscrupulous and self-acclaimed electrical artisans who do shoddy works in homes and offices. Furthermore, the government of Ghana should improve and refurnish vocational and technical institutions to provide capacity building programmes and training for local and unprofessional artisans to enable them acquire basic knowledge and skills in modern methods of wiring. Finally, the use of child-centered methods of teaching should be encouraged so boost on pupils knowledge and attitude towards electrical hazards and safety measures.

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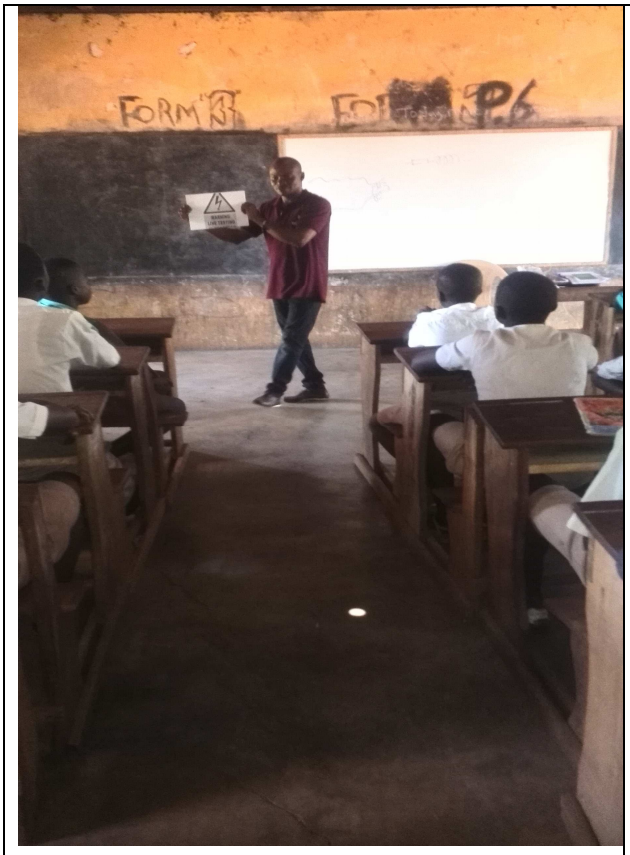
## Appendix I: Scenes from the field





**Appendix II: Interview guide for Teachers**

UNIVERSITY FOR DEVLOPMENT STUDIES
FACULTY OF EDUCATION

QUESTIONNAIRES

**Topic: Using pedagogical training to reduce domestic hazards in Tamale Metropolis**

**INTRODUCTION**

*The purpose of this study is to using pedagogical training to reduce domestic hazards in Tamale Metropolis. You are considered a major stakeholder who can provide useful information on the topic, and therefore I shall be grateful if you can be of assistance in this regard. The information provided is purely for writing my thesis for a Masters degree in Education, Training and Development. Please, your confidentiality is assured.*



**SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS**

1. Gender of respondent
   - [ ] Male
   - [ ] Female
2. Age ..... tick the applicable range
   - [ ] Below 20
   - [ ] 26-35
   - [ ] 36-45
   - [ ] 46-55
   - [ ] 56-65
   - [ ] Above 65
3. Marital Status
   - [ ] Single
   - [ ] Married
   - [ ] Divorce
4. Ethnic group
   - [ ] Dagomba
   - [ ] Mamprusis
   - [ ] Gonja
   - [ ] Bimobas
   - [ ] Akans
   - [ ] Bulisas
   - [ ] Yoruba/Hausa
   - [ ] Other (Specify) .....
5. Highest educational level
   - [ ] Basic
   - [ ] NVTI/Intermediate
   - [ ] SHS
   - [ ] University
   - [ ] No formal education

6. Religion of respondents
   - [ ] Christian
   - [ ] Islam
   - [ ] Traditional
   - [ ] Other (specify).....
7. Major source of livelihood
   - [ ] Teaching
   - [ ] Part-time work
   - [ ] Labour/by-day
   - [ ] Other (specify)……..
8. How many years have you been teaching?
   - [ ] 1-3
   - [ ] 4-7
   - [ ] 8 and above



## SECTION B: KNOWLEDGE, TRAINING AND DEVELOPMENT PROGRAMMES

9. Indicate your knowledge level of basic electricity (Please tick in the appropriate cell)
   - [ ] Ohms law
   - [ ] Electricity circuits
   - [ ] Conductors
   - [ ] Insulation
   - [ ] Other (please specify) …….
10. Please indicate the types of insulations you know
   - [ ] PVC
   - [ ] SWA
   - [ ] Polythene/rubber
   - [ ] Cellotape
11. Indicate knowledge of types of electricity circuits
   - [ ] Actual
   - [ ] Signal line
   - [ ] Block
   - [ ] Other (specify) .....
12. Indicate your knowledge of electrical cables used in wiring?
   - [ ] Type
   - [ ] Size
   - [ ] Current carrying capacity
   - [ ] Colour coding
13. What type of projective materials do you use? (tick in the appropriate cell)
   - [ ] Goggles
   - [ ] Hand gloves
   - [ ] Safety boots
   - [ ] Safety belts
   - [ ] Overall coats
   - [ ] Other (specify) ……
14. Indicate the health and safety measures you use
   - [ ] Workshop safety
   - [ ] Personal safety
   - [ ] First Aid

[ ] Work environment safety
[ ] Electrical safety
[ ] Other (specify) ……..

15. What training and development programme(s) have you obtained?
[ ] Apprenticeship
[ ] Mentoring
[ ] Teaching
[ ] Seminars/internship
[ ] On-the-job/self training
[ ] Workshops



## SECTION C: ATTITUDE OF PARENTS AND PUPILS TOWARDS ELECTRICITY AND ELECTRICAL APPLIANCE

16. How many sockets are present in each classroom?
[ ] 1
[ ] 2
[ ] 3
[ ] 4 and above

17. Do you have exposed cables in the classrooms?
[ ] Yes
[ ] No

18. Do you have fire safety measures in your school?
[ ] Yes
[ ] No

19. Do you use the services of professional electrical artisans to render electrical services?
[ ] Yes
[ ] No

## SECTION D: USE OF PEDAGOGICAL TRAINING TO REDUCE ELECTRICAL HAZARDS IN HOMES AND SCHOOLS

20. What kind or types of pedagogical trainings do you use in your school?
[ ] Teacher-centered approach
[ ] Interactive lecture
[ ] Adventurous pedagogy
[ ] Child-centered
[ ] Cooperative learning and inquiry
[ ] Critical thinking
[ ] Problem solving

21. What is the impact of child-centered method of teaching?
[ ] Socialization
[ ] Competition
[ ] Gender sensitivity
[ ] Self-efficacy
[ ] Effective monitoring

## SECTION E: CHALLENGES AND SOLLUTIONS

22. What challenges hindered the implementation of your training programmes? Tick all that applicable

[ ] Inadequate time to monitor trainee behavior after the intervention
[ ] Lack of access to pupils due to preparation towards the BECE
[ ] Local artisan had other competing scheduled activities
[ ] Lack of understanding of English language
[ ] High cost of teaching and learning materials
[ ] Donations to charitable organizations
[ ] Other (specify).....

23. Give suggestions to improving the use of pedagogical methods to reduce electrical hazards in homes and schools

(a).....

(b).....

(c).....

(d) .....

24. In your view, how can parents/pupils/local artisan be encouraged to reduce electrical hazards? Please tick appropriately

[ ] Continuous public education through print and electronic media
[ ] Seminars/capacity building workshops for local artisans
[ ] Identifying local artisans from professional associations and train them on safety
[ ] Strict enforcement of general health and safety measurement
[ ] Other (specify) ……

Thank You



**Appendix III: Interview guide for Local Artisans**

UNIVERSITY FOR DEVLOPMENT STUDIES
FACULTY OF EDUCATION

QUESTIONNAIRES

**Topic: Using pedagogical training to reduce domestic hazards in Tamale Metropolis**

**INTRODUCTION**

*The purpose of this study is to using pedagogical training to reduce domestic hazards in Tamale Metropolis. You are considered a major stakeholder who can provide useful information on the topic, and therefore I shall be grateful if you can be of assistance in this regard. The information provided is purely for writing my thesis for a Masters degree in Education, Training and Development. Please, your confidentiality is assured.*



**SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS**

1. Gender of respondent
   - [ ] Male
   - [ ] Female
2. Age ..... tick the applicable range
   - [ ] Below 20
   - [ ] 26-35
   - [ ] 36-45
   - [ ] 46-55
   - [ ] 56-65
   - [ ] Above 65
3. Marital Status
   - [ ] Single
   - [ ] Married
   - [ ] Divorce
4. Do you have children/dependents?
   - [ ] Yes
   - [ ] No
5. If yes, how many children/dependent? ……

6. Ethnic group
   - [ ] Dagomba
   - [ ] Mamprusis
   - [ ] Gonja
   - [ ] Bimobas
   - [ ] Akans
   - [ ] Bulisas
   - [ ] Yoruba/Hausa
   - [ ] Other (Specify) .....

7. Highest educational level
   - [ ] Basic
   - [ ] NVTI/Intermediate
   - [ ] SHS
   - [ ] University
   - [ ] No formal education
8. Religion of respondents
   - [ ] Christian
   - [ ] Islam
   - [ ] Traditional
   - [ ] Other (specify).....
9. Major source of livelihood
   - [ ] Trading
   - [ ] Nursing
   - [ ] Labour/by-day
   - [ ] Unemployed
   - [ ] Student
   - [ ] Electrical artisan
   - [ ] Other (specify)……..
10. How many years have you been working experience of local artisans
    - [ ] 1-3
    - [ ] 4-7
    - [ ] 8 and above

**SECTION B: KNOWLEDGE, TRAINING AND DEVELOPMENT PROGRAMMES**

11. Indicate your knowledge level of basic electricity (Please tick in the appropriate cell)
    - [ ] Ohms law
    - [ ] Electricity circuits
    - [ ] Conductors
    - [ ] Insulation
    - [ ] Other (please specify) …….
12. Please indicate the types of insulations you know
    - [ ] PVC
    - [ ] SWA
    - [ ] Polythene/rubber
    - [ ] Cellotape
13. Indicate knowledge of types of electricity circuits
    - [ ] Actual
    - [ ] Signal line
    - [ ] Block
    - [ ] Other (specify) .....
14. Indicate your knowledge of electrical cables used in wiring?
    - [ ] Type
    - [ ] Size
    - [ ] Current carrying capacity
    - [ ] Colour coding

15. What type of projective materials do you use? (tick in the appropriate cell)
    [ ] Goggles
    [ ] Hand gloves
    [ ] Safety boots
    [ ] Safety belts
    [ ] Overall coats
    [ ] Other (specify) ……
16. Indicate the health and safety measures you use
    [ ] Workshop safety
    [ ] Personal safety
    [ ] First Aid
    [ ] Work environment safety
    [ ] Electrical safety
    [ ] Other (specify) ……..
17. What training and development programme(s) have you obtained?
    [ ] Apprenticeship
    [ ] Coaching
    [ ] NVTI
    [ ] Seminars/internship
    [ ] On-the-job/self training
    [ ] Workshops



## SECTION C: ELECTRICAL APPLIANCES

18. How many sockets do you fix per a room?
    [ ] 1
    [ ] 2
    [ ] 3
    [ ] 4 and above
19. Do you sometimes expose live electrical cables?
    [ ] Yes
    [ ] No
20. Do you ensure fire safety measures at workplace?
    [ ] Yes
    [ ] No

## SECTION D: CHALLENGES AND SOLLUTIONS

21. What challenges do you face in your work.....
……..

22. Give suggestions to overcome your challenges
(a).....

(b).....

(c).....

(d) .....

Thank You

**Appendix IV: Questionnaire to Pupils**

UNIVERSITY FOR DEVLOPMENT STUDIES
FACULTY OF EDUCATION

QUESTIONNAIRES

**Topic: Using pedagogical training to reduce domestic hazards in Tamale Metropolis**

**INTRODUCTION**

*The purpose of this study is to using pedagogical training to reduce domestic hazards in Tamale Metropolis. You are considered a major stakeholder who can provide useful information on the topic, and therefore I shall be grateful if you can be of assistance in this regard. The information provided is purely for writing my thesis for a Masters degree in Education, Training and Development. Please, your confidentiality is assured.*



**SECTION A: ATTITUDE OF PARENTS AND PUPILS TOWARDS ELECTRICITY AND ELECTRICAL APPLIANCE**

1. How many sockets are present in your home and classroom?
   - [ ] 1
   - [ ] 2
   - [ ] 3
   - [ ] 4 and above
2. Do you have exposed cables in your home and classroom?
   - [ ] Yes
   - [ ] No
3. Do you have fire safety measures in your home and classroom?
   - [ ] Yes
   - [ ] No
4. Does your school and parents engage the services of professional electrical artisans?
   - [ ] Yes
   - [ ] No

**SECTION B: USE OF PEDAGOGICAL TRAINING TO REDUCE ELECTRICAL HAZARDS IN HOMES AND SCHOOLS**

5. Describe the teaching method used to teach you?
   - [ ] Teacher-centered approach
   - [ ] Interactive lecture
   - [ ] Adventurous pedagogy
   - [ ] Child-centered
   - [ ] Cooperative learning and inquiry
   - [ ] Critical thinking
   - [ ] Problem solving
6. What is the impact of child-centered method of teaching?
   - [ ] Socialization
   - [ ] Competition
   - [ ] Gender sensitivity
   - [ ] Self-efficacy
   - [ ] Effective monitoring

## SECTION C: CHALLENGES AND SOLLUTIONS

7. What challenges did you face in participating in the project intervention?
.....
.....

8. Give suggestions to improving the use of pedagogical methods to reduce electrical hazards in homes and schools
(a).....

(b).....

(c).....

(d) .....

9. In your view, how can pupils be encouraged to reduce electrical hazards? Please tick appropriately

[ ] Continuous public education through print and electronic media
[ ] Seminars/capacity building workshops for pupils
[ ] Strict enforcement of general health and safety measurement
[ ] Other (specify) ……

Thank You



**Appendix V: Questionnaire to Parents**

UNIVERSITY FOR DEVLOPMENT STUDIES
FACULTY OF EDUCATION

QUESTIONNAIRES

**Topic: Using pedagogical training to reduce domestic hazards in Tamale Metropolis**

**INTRODUCTION**

*The purpose of this study is to using pedagogical training to reduce domestic hazards in Tamale Metropolis. You are considered a major stakeholder who can provide useful information on the topic, and therefore I shall be grateful if you can be of assistance in this regard. The information provided is purely for writing my thesis for a Masters degree in Education, Training and Development. Please, your confidentiality is assured.*



**SECTION A: SOCIO-DEMOGRAPHIC CHARACTERISTICS**

1. Gender of respondent
   - [ ] Male
   - [ ] Female
2. Age ..... tick the applicable range
   - [ ] Below 20
   - [ ] 26-35
   - [ ] 36-45
   - [ ] 46-55
   - [ ] 56-65
   - [ ] Above 65
3. Marital Status
   - [ ] Single
   - [ ] Married
   - [ ] Divorce
4. Do you have children/dependents?
   - [ ] Yes
   - [ ] No
5. If yes, how many children/dependent? ……

6. Ethnic group
   - [ ] Dagomba
   - [ ] Mamprusis
   - [ ] Gonja
   - [ ] Bimobas
   - [ ] Akans
   - [ ] Bulisas
   - [ ] Yoruba/Hausa
   - [ ] Other (Specify) .....

7. Highest educational level
   - [ ] Basic
   - [ ] NVTI/Intermediate
   - [ ] SHS
   - [ ] University
   - [ ] No formal education
8. Religion of respondents
   - [ ] Christian
   - [ ] Islam
   - [ ] Traditional
   - [ ] Other (specify).....
9. Major source of livelihood
   - [ ] Trading
   - [ ] Nursing
   - [ ] Labour/by-day
   - [ ] Unemployed
   - [ ] Student
   - [ ] Electrical artisan
   - [ ] Other (specify)……..
10. How many years have you been working experience of local artisans
   - [ ] 1-3
   - [ ] 4-7
   - [ ] 8 and above



## SECTION B: KNOWLEDGE, TRAINING AND DEVELOPMENT PROGRAMMES

11. Indicate your knowledge level of basic electricity (Please tick in the appropriate cell)
   - [ ] Ohms law
   - [ ] Electricity circuits
   - [ ] Conductors
   - [ ] Insulation
   - [ ] Other (please specify) …….
12. Please indicate the types of insulations you know
   - [ ] PVC
   - [ ] SWA
   - [ ] Polythene/rubber
   - [ ] Cellotape
13. Indicate knowledge of types of electricity circuits
   - [ ] Actual
   - [ ] Signal line
   - [ ] Block
   - [ ] Other (specify) .....
14. Indicate your knowledge of electrical cables used in wiring?
   - [ ] Type
   - [ ] Size
   - [ ] Current carrying capacity
   - [ ] Colour coding

15. What type of projective materials do you use? (tick in the appropriate cell)
    - [ ] Goggles
    - [ ] Hand gloves
    - [ ] Safety boots
    - [ ] Safety belts
    - [ ] Overall coats
    - [ ] Other (specify) ……
16. Indicate the health and safety measures you use
    - [ ] Workshop safety
    - [ ] Personal safety
    - [ ] First Aid
    - [ ] Work environment safety
    - [ ] Electrical safety
    - [ ] Other (specify) ……..
17. What training and development programme(s) have you obtained?
    - [ ] Apprenticeship
    - [ ] Coaching
    - [ ] NVTI
    - [ ] Seminars/internship
    - [ ] On-the-job/self training
    - [ ] Workshops



## SECTION C: ATTITUDE OF PARENTS AND PUPILS TOWARDS ELECTRICITY AND ELECTRICAL APPLIANCE

18. How many sockets are present in a room?
    - [ ] 1
    - [ ] 2
    - [ ] 3
    - [ ] 4 and above
19. Do you have exposed cables in your home?
    - [ ] Yes
    - [ ] No
20. Do you have fire safety measures in your home?
    - [ ] Yes
    - [ ] No
21. Do you use the services of professional electrical artisans?
    - [ ] Yes
    - [ ] No

## SECTION D: USE OF PEDAGOGICAL TRAINING TO REDUCE ELECTRICAL HAZARDS IN HOMES AND SCHOOLS

22. What kind or types of pedagogical trainings are available for pupils?
    - [ ] Teacher-centered approach
    - [ ] Interactive lecture
    - [ ] Adventurous pedagogy
    - [ ] Child-centered
    - [ ] Cooperative learning and inquiry
    - [ ] Critical thinking
    - [ ] Problem solving

23. What is the impact of child-centered method of teaching?

[ ] Socialization
[ ] Competition
[ ] Gender sensitivity
[ ] Self-efficacy
[ ] Effective monitoring

## SECTION E: CHALLENGES AND SOLLUTIONS

24. What challenges hindered the implementation of training programmes? Tick all that applicable

[ ] Inadequate time to monitor trainee behavior after the intervention
[ ] Lack of access to pupils due to preparation towards the BECE
[ ] Local artisan had other competing scheduled activities
[ ] Lack of understanding of English language
[ ] High cost of teaching and learning materials
[ ] Donations to charitable organizations
[ ] Other (specify).....

25. Give suggestions to improving the use of pedagogical methods to reduce electrical hazards in homes and schools

(a).....

(b).....

(c).....

(d) .....

26. In your view, how can parents/pupils/local artisan be encouraged to reduce electrical hazards? Please tick appropriately

[ ] Continuous public education through print and electronic media
[ ] Seminars/capacity building workshops for local artisans
[ ] Identifying local artisans from professional associations and train them on safety
[ ] Strict enforcement of general health and safety measurement
[ ] Other (specify) ……

Thank You