

**UNIVERSITY OF EDUCATION, WINNEBA**

**COMPETENCES OF STUDENTS WITH VISUAL IMPAIRMENT IN  
USING ORIENTATION AND MOBILITY TECHNIQUES IN WENCHI  
SHS IN THE BONO REGION OF GHANA**



**ISAAC MARFO OSEI**

**MASTER OF PHILOSOPHY**

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**UNIVERSITY OF EDUCATION, WINNEBA**

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ORIENTATION AND MOBILITY TECHNIQUES IN WENCHI SHS IN THE  
BONO REGION OF GHANA**



**A thesis in the Department of Special Education,  
Faculty of Educational Studies, submitted to the School of  
Graduate Studies in partial fulfillment  
of the requirements for the award of the degree of  
Master of Philosophy  
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in the University of Education, Winneba**

**AUGUST, 2022**

## DECLARATION

### Student's Declaration

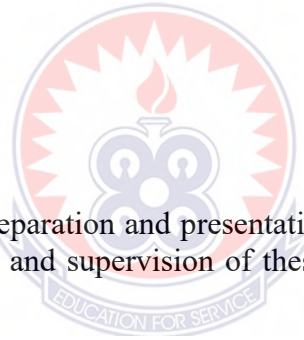
I, Isaac Marfo Osei, declare that this thesis, with the exception of quotations and references contained in published works which have all been identified and acknowledged, is entirely my own original work, and it has not been submitted, either in part or whole, for another degree elsewhere.

**Signature**.....

**Date**.....

### Supervisor's Declaration

I, hereby certify that the preparation and presentation of this thesis was supervised in accordance with guidelines and supervision of thesis laid down by the University of Education, Winneba



**Name of Supervisor:** Dr. Adam Awini

**Signature**.....

**Date**.....

## **DEDICATION**

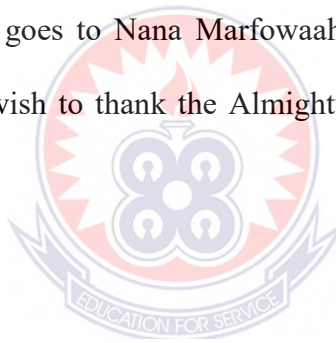
This work is dedicated to my senior brother, Mr Alexander Osei-Bonsu.



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My deepest appreciation goes to Nana Marfowaah and all the family members for their support. Finally, I wish to thank the Almighty God through whose grace I am able to get to this height.



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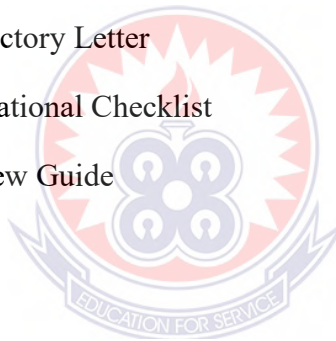
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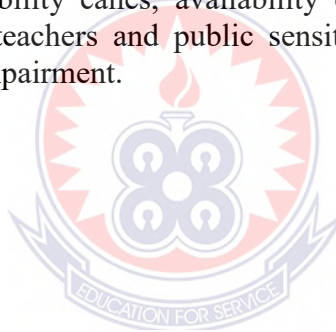
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## ABSTRACT

This study was done to assess the competencies of students with visual impairment in using orientation and mobility (O&M) techniques at Wenchi Senior High School in the Bono Region of Ghana. Thirty-five respondents were selected purposively for the study. An in-depth interview and observations checklist were conducted to elicit both quantitative and qualitative data. Data from the observational checklist were analyzed using Statistical Package for Social Science version 21.0 (SPSS 21.0) and a descriptive statistical method was used to calculate the frequency and percentages for each item-by-item analysis. The recorded interviews were transcribed and analyzed thematically. The study revealed that orientation and mobility training programs in the schools were not as effective as expected. The students were competent to use the human guide techniques, but not competent to use the mobility cane techniques and the independent travel techniques. Challenges in the school include inadequate resource teachers, lack of orientation and mobility instructor, inadequate mobility canes, the few canes were old and rigid canes, the school environment not disability friendly, the human guide not willing to offer assistance to students with visual impairment, stigmatization and limited time for orientation and mobility training. Recommendation such as qualify orientation and mobility instructor, ensuring improved universal designs in the schools for the blind, curriculum modification, provision of enough mobility canes, availability of automatic extendable walking canes, enough resource teachers and public sensitization on stigmatization against individuals with visual impairment.



## CHAPTER ONE

### INTRODUCTION

#### 1.1 Background to the Study

Competency in mobility and orientation is the ability to demonstrate those skills with state-of-the-art equipment that are available in schools (Gerstein, & Friedman, 2016). There is a worldwide concern about the restriction in movement placed on persons with visual impairment as a result of their condition (Menz et. al., 2006). Students of Wenchi Senior High School in Ghana share the same concern. The Wenchi Senior High School admits qualified students from different backgrounds, but the only students with disability the school admits are students with visual impairment. The ability of a student with visual impairments to move about independently is one of the primary goals in their total educational development (Schmitt & Schmitt, 2020). The major limitation facing students with vision loss is the problem of moving from place to place. Such persons are unable to orient themselves to other people or objects in the environment simply because of their inability or difficulty to see. Therefore, they are unable to understand their relative position in space. Consequently, they lack the confidence to move around (Giudice, 2018).

Stangl et al. (2014) pointed out that children with visual impairments, who are tactual learners, have one unique need that is quite different from all other disability groups. They depend on the use of the various techniques in orientation and mobility; either the use of the mobility cane technique, independent travel technique, dog guide technique and human guide technique in familiarizing themselves in their educational environment (Chamberlain, 2019). The use of the various techniques has engaged the attention of students with visual impairment in accessing their learning environment

and social participation in an inclusive setting (Vuuro, 2017). Inclusive and child-friendly schools seek to address the learning needs of all children with a specific focus on those who are vulnerable. The cores of inclusive and child-friendly education are the fundamental right to education for all as well as the right to non-discrimination and social participation (Schultz, 2004). Hakobyan et al. (2013) argued that, an assistive technology, like the use of the mobility cane, has helped persons with visual impairments to achieve better levels of independence in exploring their environment in an inclusive setting.

Technology available for individuals with visual impairments could be divided into three major categories; namely, no-tech, low-tech, and high-tech (Smith, 2008). No-tech or, no-technology refers to any assistive device that does not consist of any electronic device within it. No-tech items include mobility cane, abacus and braille. Low-tech or, low technology devices may be electronic but, do not include highly-sophisticated advanced components. This category includes electronic voice-recorder, audio player, and talking calculator, among others. High-tech or high technology devices utilize complex, multifunction technology and, usually, include a computer and associated software (Wachiuri, 2015). While all technologies have impacted the lives of individuals with visual impairments, low-tech devices, especially the use of the mobility cane, has had the greatest impact on success in education and employment (Stumbo et al., 2009).

The use of the mobility cane as an assistive technology advice is one of the main assistive technology resources applied to educate students with visual impairments (Smith & Kelley, 2007). The mobility cane with a handle, shaft and the tip allow persons with visual impairment to navigate around their environment, helps them to identify obstacles, landmarks, cues and clues within their surroundings, thus,

promoting individual education (Wiener et al., 2010). Also, employing the use of independent travel techniques, dog guide and human guide help persons with visual impairments in knowing their vicinity in which they live (Scott, 2009). In order to participate fully in their academic endeavours, these techniques and assistive technologies like the mobility cane, independent travel, human guide, braille, abacus, and audio recorder have had positive impact on the lives of individuals with visual impairment, thereby shaping them socially, educationally, economically and politically (Dawn, 2018).

Individuals with visual impairments have for centuries relied upon the use of the mobility cane as an assistive technology and the various mobility techniques, such as independent travel technique to access information, travel independently and participate in a variety of experiences (Leo et al., 2017). They have a long history of successful use of assistive technology dating back to ancient civilizations that used types of the mobility cane for independent travel (Sah, 2010). The history of blindness shows how specifically embodied, individual practices and the relation with objects and technologies play a central role in articulating socialness and humanity (Schillmeier, 2008).

Students with visual impairment could attain the full benefits of the mobility cane technique and the independent travel techniques if they are equipped with the needed competencies and dispositions in the use of such devices and techniques. This would further enrich and enhance students' confidence, and transform their learning environment, as well as improve their quality of life (Dzapasi, 2018). The researcher spotted some students at Wenchi Senior High School during the period of his internship and subsequent follow up to the School and found out that there seemed to be some total reliance of students with visual impairment on their sighted

counterparts for mobility that have made them reluctant and lose interest in the orientation and mobility techniques which will make them independent in accessing their learning environment. It is for this reason the researcher sought to investigate the competence of students with visual impairment in using orientation and mobility techniques in accessing their learning environment at Wenchi Senior High School.

## **1.2 Statement of the Problem**

Observations made by the researcher during the time he was doing his internship and subsequence follow up at Wenchi Senior High School appeared that some students with visual impairment in Wenchi Senior High School have difficulties with the use of mobility cane to access their learning environment. They relied on human guides to meet their independent travel needs. Also, there seemed to be inadequate specialised personnel to teach orientation and mobility skills because the teachers at the resource room were special educators, and had not specialised in orientation and mobility based on some interactions the researcher had with them. Again, a search of the literature shows that, there have been few researches conducted in Ghana to document competencies of students with visual impairment in using the mobility cane as an assistive technology device and the use of other techniques in accessing their learning environment in Ghana.

Globally, students with visual impairment have challenges in accessing their environment using the various techniques in orientation and mobility. Students with visual impairment in Ghana are not an exception. A study conducted by Bhandare (2013), asserted that individuals with visual impairment have difficulties in orientation and mobility skills not only in school but at home and in the community. This according to Bhandare (2013) is due to lack of the training on the various techniques in orientation and mobility coupled with non-availability of appropriate



orientation and mobility devices for persons with disabilities including students with visual impairment.

Furthermore, the researcher observed that the students with visual impairment used obsolete orientation and mobility devices such as outmoded white canes instead of modern ones such as automatic extendable walking canes, electronic travel aid among others which is now available with the help of technology. Students with visual impairment can use modern orientation and mobility device like the talking cane or a cane with sensor which prompt the user of a danger and direct their path. Riddick (2013), argued that students with visual impairments have been neglected and stigmatised due to their conditions in the classroom and outside the classroom. The advent of modern technology that need to be provided by the school or the society which have positive impact on the lives of people with disabilities including students with visual impairment had been neglected.

Buonanno (2008), stated that the use of the mobility cane technique and the independent travel techniques by students with visual impairment in accessing their confined environment could make a tremendous difference in the lives of the students. This would help individuals with visual impairment to improve their education, create employment opportunities, and social networks. Despite these tremendous benefits associated with access to assistive technologies including orientation and mobility devices, little research has been conducted on competencies and challenges of orientation and mobility techniques used among students with visual impairment.

To Sackey (2015), the situation in developing countries including Ghana is more worrisome, considering the fact that, a few documented researches on competency of students with visual impairment in accessing their learning environment. Such information is important for planning appropriate interventions for

the optimum utilization of the various techniques in orientation and mobility skills thereby improving the quality of life of students with visual impairment.

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

The purpose of the study was to assess the competencies of students with visual impairment using the various techniques in orientation and mobility in accessing their learning environment at Wenchi Senior High School.

### **1.4 Objectives of the Study**

1. To assess the competencies of students with visual impairments in the use of the mobility cane technique in accessing their learning environment at the School.
2. To determine how students with visual impairment employ the use of the independent travel techniques in accessing their learning environment at the School.
3. To find out how students with visual impairment use the human guide techniques in accessing their learning environment at the School.
4. To identify the challenges associated with the use of the various techniques by the students with visual impairment in accessing their learning environment at the School.

## **1.5 Research Questions**

The following research questions were raised to guide the study;

1. How competent are students with visual impairment in the use of the mobility cane techniques in accessing their learning environment at the School?
2. How competent are students with visual impairment in employing independent travel techniques in accessing their learning environment at the School?
3. How competent are students with visual impairment to use the human guide techniques in accessing their learning environment at the School?
4. What are the challenges associated with the use of the various techniques by students with visual impairment in accessing their learning environment at the School?

## **1.6 Significance of the Study**

Findings from the study would reveal the competencies of students with visual impairment in the use of mobility cane techniques. This would position resource teachers to employ effective strategies in assisting students with visual impairment to acquire or improve their skills in the use of the mobility cane technique. The study would also unveil the competency level of students with visual impairment in employing the independent travel techniques in accessing their learning environment. Furthermore, the study would bring out the competency levels of the students with visual impairment in using the human guide technique in accessing their learning environment. The findings would help evaluate the proficiency and skills of students with visual impairment in accessing their learning environment as well as the challenges confronting them as they access their learning environment.

In addition, the research findings would contribute to fill the information gap on the subject area in Ghana since very few studies have been done on this issue in Ghana. This research would, therefore, contribute to laying a strong foundation for building a scientific literature on the competency of individuals with visual impairment in using these techniques in mobility.

### **1.7 Delimitation of the Study**

Even though there are other senior high schools in Ghana that practice inclusion of students with visual impairment, this study only focused on Wenchi Senior High School in the Bono Region of Ghana because is closer to the researcher. Additionally, the study focused on only assessing the students' competencies in orientation and mobility techniques such as the use of the mobility cane technique, independent travel technique, the human guide technique, and challenges the students face when using these techniques because students ability to move independently in their learning environment is paramount and it will enable them to access relevant information and take part in school activities for the betterment of their lives. .

### **1.8 Limitation of the Study**

The researcher was unable to access competencies among some third-year students. These students were excluded because at the time of data collection, they were preparing for their final examination. Also, some students were not ready to open up on certain issues, especially, in relation to the objective on the challenges to the various techniques in orientation and mobility. These indeed affected the depth of the research findings and discussions.

## 1.9 Organization of Study

This study is organized into six chapters. Chapter One provides an overview of the use of the various orientation and mobility techniques for accessing the environment in inclusive educational settings among the students with visual impairment. It outlines the problem statement; research questions and objectives; significance of the study; as well as the limitations and delimitations of the study. Chapter Two reviews the scientific literature under specific themes. It discusses the conceptual framework which serves as a guide for data collection. Chapter Three describes the methodology and highlights the study design, the population, the sample, and sampling techniques. It also includes the techniques and tools for data collection, analysis and presentation, as well as the ethical considerations.

Chapter Four presents the findings of the study with regards to the specific objectives; students' competence on, (i) the mobility cane technique, (ii) the independent travel technique, (iii) the human guide technique, and (iv) challenges on orientation and mobility. Chapter Five discusses the findings of the study in line with the scientific literature to draw key issues that ascertain the validity and reliability of the research findings. Chapter Six discusses the conclusions and recommendations based on the findings, and the need for further research.

## 1.10 Operational Definition of Terms

**Orientation and mobility:** Orientation is the process of using the senses to establish one's position and relationship with all other significant objects in one's environment. Mobility is the ability to travel safely. Orientation and mobility training is a training which is specific to blind and low vision learners that teaches efficient and effective travel skills to people of all ages.

**Competency:** The ability to demonstrate a skill efficiently when measured against a specific standard.

**Visual impairment:** An umbrella term used to describe any kind of vision loss. Individuals with low vision have perception of light and those who are blind have no perception of light.

**Access:** Opportunity to approach or enter a place.

**Independent Travel Technique:** One's ability to demonstrate skills to successfully walk from place to place in his or her learning environment.

**Mobility Cane Technique:** One's ability to use the cane, which enables the traveler to locate a clear path of travel, negotiate varying terrains and locate and move around obstacles and hazards in the travel path for safely and efficiently.

**Human Guide:** An individual who provides travel assistance to someone who is blind or low vision by helping them move safely from one place to another.

**Learning Environment:** An environment that is conducive for acquisition of knowledge.

### 1.11 Summary of the Chapter

This chapter presented the introduction to the entire study and the background to the study. It focused on students with visual impairment and how they could attain the full benefits of orientation and mobility if they were given the needed training in orientation and mobility techniques. The current research therefore lays a strong foundation for building scientific literature on the use of orientation and mobility techniques among students with visual impairment in Ghana.

## CHAPTER TWO

### LITERATURE REVIEW

#### 2.0 Introduction

This chapter provides a review of the literature on students' skills and knowledge regarding the use of mobility cane technique, independent travel technique and the human guide technique. Sources of information for this chapter were obtained from peer-reviewed journal articles, books and institutional reports on both print and electronic media. The chapter is organized under the following sub-themes.

1. Theoretical framework
2. Conceptual framework
3. Orientation and mobility
4. Competences of students with visual impairments in the use of the mobility cane technique.
5. Competences of students with visual impairments in the use of the independent travel techniques.
6. Competences of students with visual impairments in the use of the human guide technique to access their learning environment.
7. Challenges associated with the use of the various techniques in orientation and mobility.

#### 2.1 Theoretical Framework of the Study

The model used in this research is the Conscious Competence Learning Model or matrix. The four stages of learning theory developed by Noel Bruch an employee of the Gordon Training International in the early 1970s (Sears et al., 2014). The simple conscious competence model explains the process and stages of learning a new

skill (or behaviour, ability, technique) It is most commonly known as the 'conscious competence learning model', sometimes 'conscious competence ladder' or 'conscious competence matrix', although other descriptions are used, and occasionally a fifth stage or level is added in more recent adapted versions (Stanton & Ophoff, 2013). The conscious competence model is a useful reminder of the need to learn, and train others, in stages. It has four stages, stage 1- unconscious incompetence, stage 2- conscious incompetence, stage 3 - conscious competence, and the last stage which is stage 4- unconscious competence. The learner or trainee always begins at stage 1 - unconscious incompetence, and ends at stage 4 - unconscious competence. The explanation of the 4 stages are as follows;

### **1 - Unconscious incompetence**

The person is not aware of the existence or relevance of the skill area. the person is not aware that they have a particular deficiency in the area concerned. The person might deny the relevance or usefulness of the new skill. The person must become conscious of their incompetence before development of the new skill or learning can begin. The aim of the trainee or learner and the trainer or teacher is to move the person into the conscious competence stage, by demonstrating the skill or ability and the benefit that it will bring to the person's effectiveness (Launer, 2010).

### **2 - Conscious incompetence**

The person becomes aware of the existence and relevance of the skill. the person is also aware of their deficiency in this area, ideally by attempting or trying to use the skill. The person realizes that by improving their skill or ability in this area their effectiveness will improve. Ideally the person has a measure of the extent of their deficiency in the relevant skill, and a measure of what level of skill is required for



their own competence. The person ideally makes a commitment to learn and practice the new skill, and to move to the 'conscious competence' stage. The person must become conscious of their incompetence before development of the new skill or learning can begin. The aim of the trainee or learner and the trainer or teacher is to move the person into the 'conscious competence' stage, by demonstrating the skill or ability and the benefit that it will bring to the person's effectiveness (Brown, 2004).

### **3 - Conscious competence**

The person achieves 'conscious competence' in a skill when they can perform it reliably well. The person will need to concentrate and think in order to perform the skill. The person can perform the skill without assistance. The person will not reliably perform the skill unless thinking about it - the skill is not yet second nature or automatic. The person should be able to demonstrate the skill to another, but is unlikely to be able to teach it well to another person. The person should ideally continue to practice the new skill, and if appropriate commit to becoming 'unconsciously competent' at the new skill, practice is the single most effective way to move from stage 3 to 4 (Cannon, Feinstein & Friesen, 2010).

### **4 - Unconscious competence**

The skill becomes so practiced that it enters the unconscious parts of the brain - it becomes second nature. Common examples are driving, sports activities, typing, manual dexterity tasks, listening and communicating. It becomes possible for certain skills to be performed while doing something else, for example, knitting while reading a book the person might now be able to teach others in the skill concerned, although after some time of being unconsciously competent the person might actually have difficulty in explaining exactly how they do it - the skill has become largely

instinctual. This arguably gives rise to the need for long-standing unconscious competence to be checked periodically against new standards (Bellack, 2015).

The trainer assumes the trainee is aware of the skill existence, nature, relevance, deficiency, and benefit offered from the acquisition of the new skill. Whereas trainees at stage 1 - unconscious incompetence - have none of these things in place, and will not be able to address achieving conscious competence until they've become consciously and fully aware of their own incompetence. This is a fundamental reason for the failure of a lot of training and teaching (Ramani & Leinster, 2008).

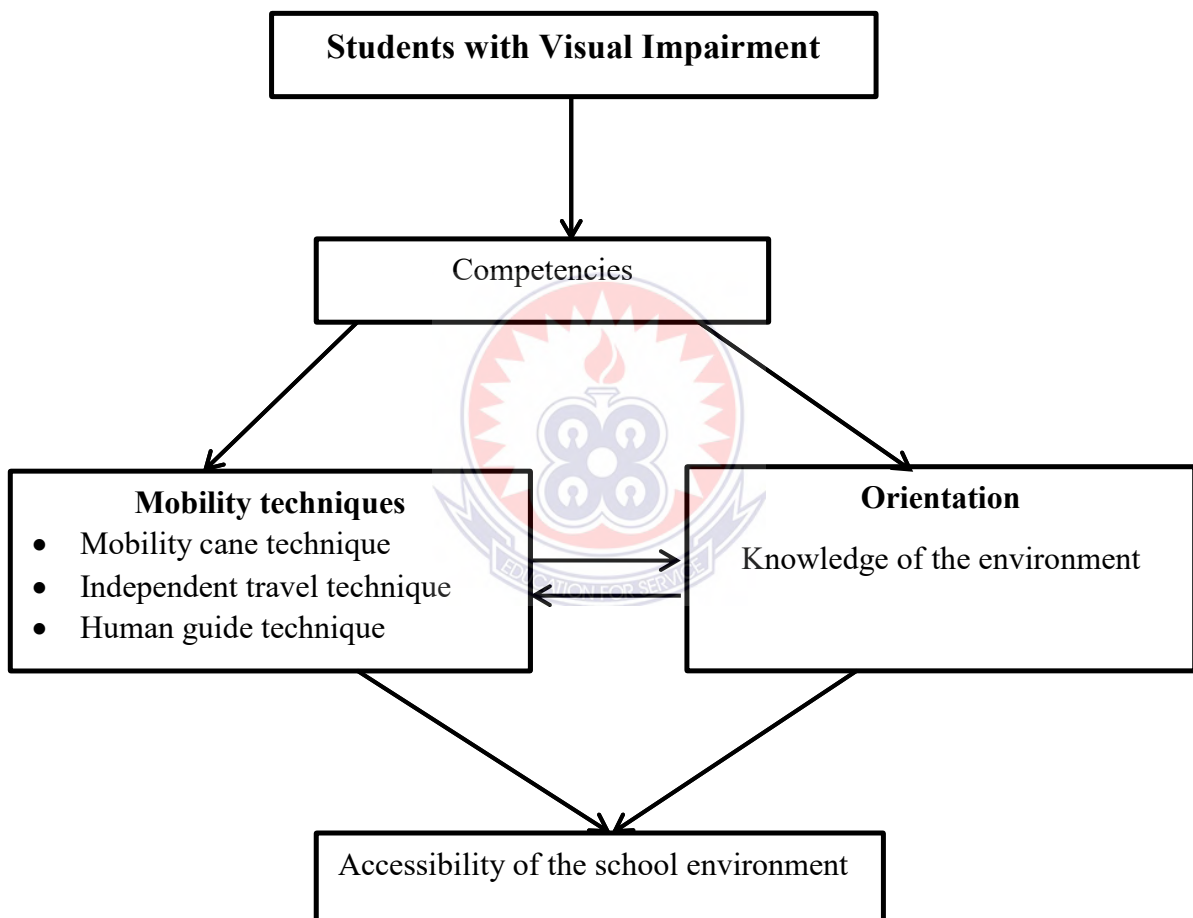
If the awareness of skill and deficiency is low or non-existent - the learner is at the unconscious incompetence stage - the trainee or learner will simply not see the need for learning (Knutson, 2006). It is essential to establish awareness of a weakness or training need (conscious incompetence) prior to attempting to impart or arrange training or skills necessary to move trainees from stage 2 to 3 (Weber & Aretz, 2012).

People only respond to training when they are aware of their own need for it, and the personal benefit they will derive from achieving it.

The progression is from stage 1 through 2 and 3 to 4. It is not possible to jump stages. Hertzog et al., (2008) argue that for some skills, especially advanced ones, people can regress to previous stages, particularly from 4 to 3, or from 3 to 2, if they fail to practice and exercise their new skills. A person regressing from 4, back through 3, to 2, will need to develop again through 3 to achieve stage 4 - unconscious competence again for certain skills in certain roles stage 3 conscious competence is perfectly adequate.

Progression from stage to stage is often accompanied by a feeling of awakening - 'the penny drops' - things 'click' into place for the learner - the person feels like they have made a big step forward, which of course they have. People develop competence only after they recognize the relevance of their own incompetence in the skill concerned (Brown, 2004).

## 2.2 Conceptual frame Work of the Study Training



**Figure 1: Conceptual framework on competence in orientation and mobility technique**

Source: Author (2019).

From Figure 1, the conceptual framework explains how students with visual impairment could be competent in using orientation and mobility techniques. The overall objectives of the conceptual framework were on how students with visual

impairment can move around the school environment as a way of accessing the learning environment without facing difficulties.

For students with visual impairment to be able to access the school environment successfully, students need to be competent in the use of the various mobility techniques such as mobility cane techniques, independent travel techniques and human guide techniques as well as competence in orientation whereby students with visual impairment could gain knowledge about the school environment for easy, free and safety accessibility of the school environment.

### **2.3 The Concept of Orientation and Mobility**

Orientation and mobility skills became very important in America in the 1950s and the work of Dr. Hoover marked the beginning of orientation and mobility training for persons with visual impairment in the 1960s (Wiener et al., 2010). Various scholars have defined orientation and mobility in different ways due to their diverse views about it. For instance, Okoli (2003) stated that orientation is the process of applying the senses to establish one's location in relation to all other significant objects in one's environment. Orientation is a person's awareness of self with regard to position and time and place and personal relationship (Borg and Kristiansen, 2004).

Janssen and Van Yperen (2004), also stated that orientation is to establish one's position in space and relative position to other objects in the environment. Ocloo (2003), explained that mobility is the actual movement or locomotion of an individual from one position to other parts of the environment. Scott (2009), explains mobility as the ability to move independently, safely and purposefully through the environment. Again, Whitehead (2006) stated that mobility is the degree of free, unaided movement that a person achieved on the course of his or her normal daily routine. From the above definitions, it is evident that orientation and mobility are

interdependent and there is no purpose or meaning to the movement, if one is mobile but not oriented. Orientation skills and mobility skills are so closely related that in order to be an efficient traveller, one must be proficient in both areas (Ishmael, 2015).

Danaher (2019), stated that orientation and mobility instructions enable the student to move purposefully in any environment, familiar or unfamiliar, and to function safely, efficiently, gracefully and independently. Mantey (2014), remarked that orientation and mobility training create social recognition and enhances economic prospect, employment opportunities and self-esteem of the individual with visual impairment. Lugome (2018), stated that social interaction skills, independent living skills, compensatory skills, recreation and leisure skills, career education, the use of assistive/adaptive technology, visual efficiency skills, and self-determination, and orientation and mobility are specifically identified in the national agenda for the education of children and youths with visual impairments, including those with Multiple Disabilities, as essential elements of the expanded core curriculum for learners with visual impairments. Professionals recognize that orientation and mobility should be given the same attention as the other subject competencies contained in the general education curriculum (Tataka, 2018).

Zimmerman et al. (2015), argued that the development of orientation and mobility skills for persons with visual impairments has been associated with several benefits, including improved academic performance, access to employment, increased integration into the community, and access to social networks. The lack of orientation and mobility skills has been reported to be related to the underemployment and unemployment of individuals with visual impairments (Holiday, 2013). Data regarding the orientation and mobility skill levels of young children with visual impairments are less available in the fields of literature (Malik et al., 2018).

Although instructional resources and literature exist relative to the involvement of children with visual impairments in orientation and mobility, little research is available on the level of orientation and mobility skills demonstrated by children with visual impairments, or the specific orientation and mobility training needs of children with low vision (Jurmang, 2015).

Hersh (2016), stated that the area of orientation and mobility includes skills related to safe and efficient movement through the environment, in both familiar and unfamiliar settings in- and outdoors. Orientation and mobility comprise of two distinct, but mutually dependent fundamental elements: (a) orientation and (b) mobility; both are necessary if purposeful movement is to occur.

A traveller who is accomplished in orientation has acquired the concepts of body image, knowledge of his environment, and the ability to relate one's self position to the environment, as well as appreciation of the relationship of features within the environment to other features in the same environment (O'Mahony, 2015). The second fundamental element of orientation and mobility is mobility. The term mobility refers to a person's ability to move from a particular position in his environment to another. Mobility entails the execution of purposeful movements that are planned using the orientation process. For successful orientation and mobility to occur, efficient and purposeful movements are vital (Prout, 2018).

The techniques covered under the content area of orientation and mobility include orientation, human guide, self-protection, access to the physical spaces, use of the mobility cane, independent travel technique, acceptance, and refusal of assistance, the use of various transportation options, travel in different environment, and street crossing (Malik & Manaf, 2020). Additionally, the ability to efficiently demonstrate

these techniques requires the orientation and mobility student to acquire motor skills, perceptual-motor coordination, procedural knowledge (how and where to take action), episodic knowledge (used to remember locations of obstacles or landmarks), and conceptual or semantic knowledge (knowledge of characteristics of situations or environments), which can be used to generalize concepts and skills to unfamiliar environments (Wiener et al., 2010).

Orientation within one's environment requires the analysis of various sensory perceptions and the function of giving attention to the most valuable sensory input available, while disregarding less reliable or relevant input. Its purpose is to determine one's position within an environment and plan sequence of efficient movements to reach a desired goal or destination (Iwarsson & Ståhl, 2003). For individuals with visual impairments, the amount of usable visual input ranges based on the individual's functional visual abilities, and can include various levels of light perception, light projection, ability to distinguish features of objects or landmarks, or functional use of vision that promotes safe movements within or between spaces (Hersh & Johnson, 2010).

Orientation includes the utilization of available landmarks, cues, and clues to deduce one's location, and requires the understanding of spatial and environmental concepts. Examples of spatial concepts include above, under, and behind, horizontal, and diagonal, as well as directions and various shapes (Purves et al., 2018). Knowledge of environmental concepts allows the orientation and mobility traveller to distinguish items and locations based on their qualities. For example, knowledge of the particular characteristics of an item can assist in the identification of that item as a grass line, fence, parking lot, or grid pattern (O'brien et al., 2014).

In view of this, Mahlo (2017) stressed that the vision related needs of the students should be supported within their educational environment, although adaptations may be made to the environment, and more than it, comprehensive and specialized services may often be required. Jurmang (2015), stated that students with visual impairment required orientation and mobility, which is a related service according to Individuals with Disability Education Act (1990). The author, stressed on instructions in orientation and mobility for safe movement of the individual with visual impairment in order to participate in educational programmes. Parker et al. (2006), mentioned that orientation has been traditionally defined as the process of using the senses to establish one's position and relationship to all other significant objects in the environment. Agesa (2014), also explained that mobility is the capacity or facility of movement, and has two components; mental orientation and physical locomotion.

Oluokun (2020), stated that students with visual impairment must be taught mental orientation and physical locomotion skills so that they can move confidently and master independent travel within their environment. Attia and Asamoah (2020), also stated that orientation and mobility is very important in the life of students with visual impairment because it enables the individual to move firmly in any environment. Mason and McCall (2013), recommended that orientation and mobility training should begin at the very earliest age, preferably in the home, and should be integrated throughout the curriculum of learners who are blind or visually impaired.

Augestad (2017), said that for successful integration of persons with visual impairment with their sighted counterparts, they must have sufficient competencies in orientation and mobility skills. This means that individual with visual impairment should be able to achieve, to some extent, the same level of independence in mobility



just as their sighted counterparts. Fayol (2016), stated that, mobility implies a good, methodical sense of direction, smooth, well-coordinated movement and concise, and a clear-cut action that signifies confidence. Orientation and mobility are vital components of the education of persons with visual impairment. Teachers of these individuals must also be equipped with basic orientation and mobility skills to be able to educate these students (Corn & Erin, 2010).

Elisha (2019), noted that orientation and mobility training creates social recognition, economic prospects, employment and self-esteem of individuals with visual impairment. Dogbe (2005), suggested that the individual with visual impairment needs training in some of the skills to compensate for the effect of sight loss, in order to function independently in society. These skills are known as compensatory or adaptive skills. Major among them are orientation and mobility and daily living skills. Doostdar (2018), also stated that orientation and mobility skills are learned by sighted individuals through observation, imitation, or incidental learning. In order for students with visual impairment to become conversant with this concept, they need to be taught orientation and mobility. Hart (2013), said that if a person who is blind will be able to develop competency in the awareness of their environment, then they should have extensive orientation and mobility training experiences. Evidence from research confirms that competency plays a key role in a person's psychological self-concept, and that orientation skills are necessary components to the mobility skills of an individual with visual impairment.

Anderson (2010), also stated that mobility is the ability to move safely, gracefully, and efficiently from one point to another within the environment. Orientation and mobility skills provide the students with visual impairment the ability to know the environment, where one is, where one wants to go, and correct use of the

environmental clues to get to their destination. Lourens (2015), concluded that orientation and mobility skills help the students with visual impairment to be psychologically alert of the dangers in the environment. They contribute positively to the self-concept of the individual with visual impairment, and as they move efficiently and independently in various environments, their self-confidence would be enhanced.

Ocloo (2003), argued that, orientation and mobility can play its vital role only if it is given serious attention. Most adults who are blind, and individuals with old age visual impairments, are still dragged along in homes and on the streets under the wrong notion of using human guide techniques without any tangible training or knowledge of orientation and mobility techniques. Deiner (2012), observed that the most disheartening situation is that there are a few mobility training centres that exist. Even the rehabilitation centres have few qualified mobility instructors and inadequate devices. The individuals with severe conditions are not being taught independent travel technique perhaps because of lack of some devices, like object detectors, among others.

Agbeke and Ameku (2003), as cited in Okyere and Adams (2003), stated that the fact that blindness imposes basic limitation on the individuals who are blind in the range of experiences from the environment, and the ability to access and interact and have control of the environment and themselves in relation to it cannot be underscored. It is therefore imperative not to compromise, the training of orientation and mobility skills to students with visual impairment. Deiner (2012) also stated that the training is necessary because the need to explore and gather information that widens one's prospect largely depends on knowing the environment and how to get information. In orientation and mobility training, the student with visual impairment must be able to put orientation and mobility skills together to travel independently.

## 2.4 The Concept of Visual Impairment

Lieberman et al. (2013), stated that the term 'visual impairment' can be used to describe individuals whose visual abilities range from having a great deal of useful vision to complete blindness. Various terms are used to describe individuals with visual impairments. Giudice (2018), said that blindness refers to the absence of usable vision, is often used to identify the condition of individuals who may be able to perceive light or images, but are not able to use residual vision for functional purposes. Rubin (2012), also stated that, the definition used for the purpose of determining eligibility for governmental services, 'legal blindness', refers to a visual impairment resulting in a maximum visual acuity of 20/200 in the better eye after refractive correction, or a visual field of 20 degrees or less in the better eye.

For educational purposes, the definition of visual impairment encompasses the definition of legal blindness, but includes students whose visual acuities may be better than 20/200. Botsford (2013), explained that visual impairment including blindness means impairment in vision that, even with correction, adversely affects a child's educational performance. The term visual impairment includes both partial sightedness and blindness. Zhao et al. (2019), explained low vision as having difficulty accomplishing visual tasks, even with the use of prescribed corrective lenses, but who can enhance his or her ability to accomplish these tasks with the use of compensatory visual strategies, low vision and other devices, and environmental modifications.

The need to do evaluation for students with visual impairments to determine appropriate services should be conducted by a teacher of the visually impaired and must include the assessment of functional vision, daily living skills, and mode of reading (Kelly, 2015).

Corn and Erin (2010) explained that functional vision assessments examine a student's vision beyond the medical setting to determine how a student uses his or her residual vision to complete tasks in various natural environments, including the academic setting, in- and outside, and under various lighting conditions. This procedure is used to determine what helps or hinders an individual's visual performance. Usher (2009), indicated that information is collected through reviews of student records, observations and interactions with the student, and interviews of the student, parents, and school personnel. Information obtained through the functional vision assessment documents how the student visually reacts or interacts with his or her environment, and is used to create an appropriate educational programme for the student. Common areas addressed in the process are, visual functioning during daily tasks, basic visual skills, visual perceptual skills, and strategies for accessing the visual environment.

#### **2.4.1 Impact of visual impairments on learning and movement**

According to McGregor (2014), it has been estimated that, approximately, 80% of learning occurs through vision. d'Souza et al. (2017), stated that without the richness of information provided by typical vision, the development of the child with a visual impairment can be adversely affected across many domains. This developmental difference occurs as a result of the limited extent and frequency of experiences with the environment, including interactions with family members and peers. McLinden, and McCall, (2016), found out that, children who have visual impairment have decreased opportunities for incidental learning and are less likely to gather complete sensory information to interpret the world around them and make sense of their surroundings. Downs and Stea (2017), also stated that learners with visual impairments have a limited range and variety of experiences, and often lack

control over their environments and themselves in relation to it. By relying solely on their other senses, they often miss vital information about their surroundings.

The influence of vision on the acquisition of information regarding the world is vast and varies based on the level of functional vision available to the learner, which can range from only light perception to the ability to read standard print (Clark & Mayer, 2016). The visual system allows individuals to make sense of their world through the collection, organization, and interpretation of the sensory information it processes and lack of clear visual input can lead to variations in development and the extent of learning that occurs (Yamins & DiCarlo, 2016).

Arter (2013), said that children with visual impairment do not learn incidentally through visual imitation like their sighted peers. The ability of a child with visual impairment to learn can be affected across the interrelated domains of development as a result of the lack of visual sensory input and inconsistent experiences with the environment McLaughlin et al (2017). Areas at risk for delays in development due to the effects of blindness and visual impairment have been documented in detail by numerous professionals in the field of visual impairment (Al-Dababneh et al., 2015). Cognitive, social and emotional, daily living, career and vocational, sensory and motor, and orientation and mobility skills, as well as the development of concepts, have been identified as areas of development most at risk when a child has a visual impairment (World Health Organization, 2012).

Literature specific to the provision of orientation and mobility instruction to students with low vision is limited (Blake, 2020). Cuturi et al. (2016) stated that few children with low vision receive orientation and mobility instruction, although the presence of visual impairment had direct impacts on orientation and mobility, including the concept development and travel ability. Pick (2012) observed that

children with low vision do not have the innate skills to access unfamiliar areas and to use visual cues for orientation.

Visual access to the environment is broadened beyond access to print materials in the school building, thus affording access in the community for the purposes of employment, activities of independent living, and recreational activities (Kasser & Lytle, 2013).

## **2.5 Competence of Learners with Visual Impairment in the use of Mobility**

### **Cane Techniques**

The use of mobility tools often requires direct instruction. Specifically, professional guidance may be necessary in the use of various methods and tools designed to achieve mobility (Ventola, 2014). Instruction is modified based on the physical and cognitive ability of the traveller, particular environment for use, and potential hazards or terrains encountered (Elford & Adams, 2019). Mobility systems also include canes, pre-canes, adapted or alternative mobility devices, and electronic travel aids (ETAs). Additionally, instruction is necessary in the techniques for using mobility systems, such as the various methods for grasping the mobility cane and the systematic movements required for effective travel within various parameters (Malik & Manaf, 2020). For example, the technique used to ascend stairs is different from the technique used to descending stairs. Each set of travel conditions requires analysis by the orientation and mobility traveller to determine the appropriate use of the travel device for the particular circumstances encountered (Bohte & Maat, 2009).

Ferguson (2007), stated that the original notion of using a white cane was started by lion international in Peoria, Illinois in 1930. Webster (2008), said that the lion wooden cane was short and fat, tapered towards the tip, knobby handle. The cane was painted white except for six inches red tip. The purpose of the lion's cane was to

alert motorists that a blind individual was about to cross a street (Borkowski, 2009). Williams (2018), said that Lions International was instrumental in getting the Peoria City Council to pass the nation's first "white cane law" requiring cars to stop when drivers spotted the white cane. However, the long mobility aid, as it is now known, came into being as a result of a personal experiment of Dr. Hoover, who tried to move around with an ordinary stick while blind-folded. This experience led him to conclude that the stick was inadequate in many ways. He thereafter developed a suitable mobility cane for people who are blind (Braybon & Summerfield, 2012).

Wang and Kuchenbecker (2012), explained that the cane is employed to explore the ground immediately ahead and to protect users against hazards and obstacles. Gibson (2014), mentioned some of the importance of mobility cane to students with visual impairment. The author stressed that the use of mobility cane enables an individual who is blind to distinguish between different ground surfaces, concrete, sand, tiles, and others. A student with visual impairment can also detect pot holes and other small hazards almost accurately. The mobility cane aids them to detect obstacles within their footpath.

Maemba (2017), identified some importance of the mobility cane to students with visual impairment. The author emphasized that the mobility cane plays an important role in the education, social integration, and comprehensive rehabilitation of students with visual impairment. By providing a means of getting in and out of work, the mobility cane enables them to seek a variety of jobs, and thus, advances their economic rehabilitation. The correct use of the mobility cane by students with visual impairment can help them to walk safely and independently. Worth (2013), stated that the mobility cane is the most frequently used device for persons with visual impairment who travel by themselves, and without the assistance of someone else.



The mobility cane contributes to safety travel and to the orientation of the client. In case of objects and obstacles in the path of travel, the student with visual impairment should detect them with the cane instead of bumping into them (Sobek & Miller, 2006). Using the mobility cane informs others that the client is an individual with visual impairment.

Goldschmidt (2018), emphasized that the touch cane technique allows the traveler to detect drop offs (curbs, steps, etc.) and objects in the travel path. Touch cane technique is one of the mobility cane techniques. Scott and Stanten (2019), explained that in using the touch cane technique the cane is held in the midline of the body and swung from side to side to a low, flat arc. The cane tip contacts the walking surface at the point one inch outside the widest part of the body. They stress that the cane is swung in a rhythmic manner with cane tip striking the walking surface on the side opposite the forward foot. The basic notion behind the touch cane technique is for the traveler to clear the way for his next step.

The touch cane technique helps in easy movement. Kalu (2019), described the procedure involved in using the touch technique. According to Kalu, the cane grip rests in the mid-line of the base of the pattern with the back of the hand facing laterally. The index finger is extended downwards along the flat side of the grip. The thumb is positioned over around the grip so that the crown is in interior position. The wrist should be centered at the body midline that is the cardinal plane of the body and out from the body at a point where the arm-care combination forms a straight line. To clear the area for each step before it is taken, ensuring safety in travel. At the apex of the arc, the cane tip is one inch above the ground. The individual who is blind moves in a rhythmic manner as the cane tip and the heel opposite foot contact the walking



surface in union. The individual's rhythm should be in accordance with their natural walk and pace.

The diagonal technique is one of the major mobility cane techniques that are used by individuals with visual impairment to move about safely in their environment. Goldschmidt (2018), explained that the purpose of the diagonal technique is to enable the individual to use the mobility cane to travel independently in their learning environment with some degree of protection. Moats (2016), emphasized that, in using the diagonal technique, the hand is placed on the handle of the white cane with the back of the hand facing up, and the fingers flexed around the grip. The thumb is extended and rests on the grip as it points down the shaft. The upper arm, forearm, and the wrist are fully extended. The cane needs to be one inch above the ground. This technique provides enough frontal protection from the low objects or obstacles. Jacobson (2013), stated that in diagonal technique, the cane is held diagonally across the body so it acts like a 'bumper'. The diagonal technique provides advance warning of a low object or obstacle and should be taught as an extension of the hand and forearm techniques.

## **2.6 Competence of Learner with Visual Impairment in the use of Independent Travel Techniques**

Many physical hazards can be avoided through the use of effective protective techniques. Vanderpuye et al. (2020), explained that independent travel technique requires travellers to use their hands and arms as bumpers, thus reducing the likelihood of injury to the face and body. The upper and lower body techniques protect different portions of the body.

Willardson (2013), stated that in the upper body protection, the hand and arm are extended across the body at shoulder height in order to provide defence from objects encountered at the head and chest level. With the palm facing outward, the hand and forearm will contact objects, thus providing a buffer for the upper body from contact with potential hazards. Kumar (2012), explained that in lower body protection, the hand and arm are placed across the groin area, with the palm facing inward. Through the use of this technique, the lower body receives protection below the waist from items that may be encountered, such as desks and chairs. Self-protection can be used while moving through open spaces, by using the trailing technique in independent travel, and can be helpful with both indoor and outdoor travel.

Trailing help students with visual impairment to walk straight and provide them with tactual information and enable them to detect landmarks or find doorways (Goldschmidt, 2018). Trailing is a process of using the back of the hands to follow a wall, edge of a table, or other similar objects (Chong & Vathylakis, 2015). When using trailing technique, the individual should stand next to the object he/she wants to follow and extend the arm that is closer to the object, make sure the back of the finger should touch the object and walk by trailing fingers along the surface towards your destination (Goodale & Milner, 2013).

O'Mally and Antonelli (2016), emphasized that, in accessing the learning environment, students with visual impairment could be seen as seekers of information regarding the structure of an area and its contents. Kaiser et al. (2018), said that, in order to ensure safety and the development of specific competencies, the initial explorations of traffic intersections or buses would typically require the assistance of a qualified orientation and mobility instructor. They stressed that to travel within

one's neighbourhood or community and to cross street often requires the traveller with visual impairment to acquire orientation and mobility skills. Mastery of specific orientation and mobility techniques is necessary to ensure safe and efficient street crossing. Instruction in street crossing encompasses the coordination of many skill areas, including orientation, application of concept skills, familiarization techniques, and the various cane techniques (Szabo & Panikkar, 2017).

## **2.7 Competence of Learners with Visual Impairment in the use of Human Guide Techniques**

The human guide technique (known as sighted guide) is a mobility system that allows an individual with visual impairment to actively participate in travel through different environments using the assistance of another individual, who typically has the use of vision (Cuturi et al., 2016). Specific actions are taught to the individual with visual impairment and the human guide that encourage efficient movements of them as a team. This method involves the physical contact of the human guide and the traveller, which is typically maintained through the grasp of the guide's arm, slightly above the elbow (Morrison et al., 2013).

Rossman (2010), explained that precise techniques are taught to be applied when the team is travel through various situations, including ascending and descending stairs, reversing directions in travel, transferring from one side of the human guide to the other, negotiating narrow passage ways, negotiating doors, and locating a seat. Humaira (2015), stated that the unique techniques that could be taught to students with visual impairment include using human guide while holding the mobility cane; using human guide within various settings, such as cafeterias, auditoriums, classrooms, and crowded areas among others; and self-advocacy skills, such as training others to provide human guide.

Rayburn (2012), observed that the human guide technique will afford the person with blindness to travel safely with the sighted person within different environments and a variety of conditions. Besides, the technique will provide the individual with blindness with basic skills for subsequent skills and prepare them for independent travel in areas like kinesthetic awareness, graceful movement and orientation, in human guide. The application is that if the human guide is in a level terrain or sloppy environment it will be felt and detected by the person who is blind, so they can adjust accordingly.

Sanoff (2016), explained that, establishing contact with individuals with visual impairment could be either verbally or physically, is the most appropriate point to start with. Through this, the individual becomes acquainted with the human guide to promote trust. The author reported further that, the individual with visual impairment grasps the human guide's arm lightly just above the elbow. In the case of a child, or small person, the wrist or the hand may be preferable.

Wayne and Fuerst (2013), stated that there are some individuals with blindness who prefer holding hands instead of grasping the human guide, just a little above the elbow. The guides' arm can be across the body. It is important that the human guide's arm should be close to the body so that body movement can be picked up easily by the individual with visual impairment. In setting off, the human guide should be half a step ahead of the individual with blindness. Shove et al. (2012), explained that the changing of sides or hands should be done frequently, as a daily routine, in order to make the student with visual impairment change sides with the human guide. Covey (2013), observed that, the individual with visual impairment would have to move behind the guide's back. Then, both of them would now move across to the other side to engage the other arm. McLinden and McCall (2016), stated that individual with

visual impairment and the human guide should make sure there is nothing behind which may pose danger to the student with visual impairment, when changing sides. They stressed that the human guide should slow down and make sure the individual with visual impairment maintains light contact through the guide process.

## **2.8 Challenges Associated with the various Techniques involve in Orientation and Mobility**

The challenges involved when using the various techniques have been categorized under three sub-themes, which include challenges with (a) mobility cane techniques, (b) independent travel techniques, and (c) human guide techniques.

### **2.8.1 Challenges associated with the mobility cane techniques**

The World Health Organization (WHO) estimates that 285 million people worldwide are individuals with visual impairment, with 39 million of that number being individuals who are blind, and 246 million being individuals who have low vision (Rooth, 2017). O'Brien et al. (2014), explained the downside of the mobility cane is that obstacle detection is limited by the length of the cane, and it provides minimal feedback about obstacles that are off the ground, such as tree branches or overhanging sign which may be located at arm or head height. Owen (2012) explained that mobility aids have been developed to enhance the functionality of a white cane. Many of these aids are electronic-based and are either positioned directly onto the cane. The author further explained that, those devices are intended to give additional feedback to the user about their surroundings. The feedback generated is conveyed to the user in a variety of forms, such as tactile feedback.

Tactile feedback is considered to be relatively simple and does not interfere with other audio cues that individuals with blindness use to gain further information about their surroundings. However, the vibrations of an electronic travel aid (ETA) that is positioned on a mobility cane must not interfere with tactile feedback from the ground, as this is the major function of this mobility aid. Ground surface feedback traveling up the length of the white cane has been found to resonate at frequencies of between 30–100Hz (Real & Araujo, 2019).

Chanana et al. (2017) stated that the vibration of the electronic device can be set to differ in frequency to avoid interfering with this feedback. Signal-processing algorithms have also previously been developed to address the issue by filtering the device feedback from other tactile feedback obtained in their environment. An alternative approach is to convey this tactile information in a device that is worn by the user. Several groups have adopted this approach with different devices, including clothing items such as belt (James & Petrone, 2016). These systems are often more complex than devices attached to a mobility cane, as they contain multiple locations on the body to generate feedback that needs to be learnt and decoded by the user. Currently, the optimal number of feedback channels is unknown, and further investigation surrounding this issue is required (Meliones & Sampson, 2018).

There are some auditory cues that are attached to some of the sophisticated mobility canes. In the environment, noise from moving vehicles and birds among others may interfere with the effective use of those canes. This is because the noise will make persons with visual impairment unable to discriminate between the auditory cues from the device and from that of the environment. (Sorgini et al., 2018). An advantage of auditory feedback is that it can provide an avenue for conveying more

sophisticated descriptions about obstacles including information about movement (Bujacz & Strumiłło, 2016).

These types of devices aim to address the main criticism of many of the electronic aids, in that, most devices are only able to give information about the presence of an obstacle rather than the shape or form of the object (Elmannai & Elleithy, 2017). Several drawbacks exist for this type of feedback, as these devices may limit individuals from receiving other auditory cues in the environment that are normally relied upon for mobility. If the electronic device conveys auditory information in a method other than through headphones, then this might be difficult for individuals to detect in noisy environments, or individuals might be self-conscious of this feedback from the device, particularly in quieter environments (Giudice, 2018).

Silva et al. (2016), described the use of dual approach, which involved a combination of tactile and auditory feedback to convey information about obstacles. Tactile feedback conveyed the location of an object and auditory feedback conveyed the color and brightness of an object. The authors stress that devices which have both tactile and auditory feedback may benefit users and provide flexibility to choose which feedback option to select for a given environment. Despite the number of ETAs available, user acceptance is low. Electronic Travel Aids (ETAs) are rejected for a variety of reasons: Feedback from the sensor often compromises the natural feedback of the cane or the user's own senses. Many ETAs feed unwanted ambient echoes to the user from walls and ceilings, and the costs of current ETAs range from hundreds to thousands of dollars, which is prohibitively expensive for most blind people to buy. The complexity of some of the available ETAs and the limited training available also reduce the uptake of ETAs (Calder, 2009).



Pissaloux et al. (2017), conducted a study, in which sixteen sighted individuals were blindfolded and participated in two mobility courses. The participants navigated their environment using an ordinary mobility cane and a mobility cane with an electronic device attached, respectively. The hypothesis was that the tactile feedback provided by the sensor would change how participants navigated the area by providing warning of obstacles, because commercial ETAs are often complex and prohibitively expensive for most blind users, as well as the sensory feedback often compromised the natural feedback of the cane. The cane with electronic device had been designed for simplicity and low cost, but was still expensive for individuals with visual impairment. Scopatz and Zhou (2016), said that electronic travel aids users with subjective responses were mostly positive, with participants finding navigation easier, feeling more confident, and perceiving fewer obstacle collisions when using the electronic device.

Zhong (2019), experimented with five obstacles of varying sizes and heights, and positioned them on the course to test the effectiveness of the cane such as, table tops, signs, posts, or over-hanging tree branches. The test environment simulated the type of environment a person with visual impairment would often be required to navigate. The particular interest was the simulated tree branch, because the mobility cane alone was unable to detect it using a typical swing style. Many simple ETAs provide constant ambient feedback from the walls in a corridor, so the test environment provided information on whether the device would be useful in an indoor setting. Two different courses were arranged for these trials, and each participant trialed both courses to avoid adaptation and learning of the courses. The order in which the courses were used was alternated between each subsequent participant.



Vaughan (2020), stated that some assistive technologies which include electronic mobility cane which have a device that detect obstacles, the device which had been fixed in the cane provides vibratory feedback to warn the user of obstacles above knee height. The author noted that the time taken for users of mobility canes to complete mobility course practically using either a simple white cane or a sophisticated one such as electronic white cane is not sufficient for users of the device to acquire enough practical knowledge of the white canes to enable them effectively utilize the white canes. Upton & Stein (2015), similarly asserted that, the rate of obstacles interfering in the usage of the different navigation aids is high, and hence users of white canes need more time to practice the use of the devices. Kim and Cho (2013), however, indicated that, different time frame needs to be allocated for the practical training of users on assistive technologies including the mobility cane. This is because some mobility canes are simple to use and can be learned within a short period of time while others too could be seen as complex and technical such as the electronic travel aid which is difficult to learn and practice hence requires more time.

Guy and Truong (2012), stated that the majority of studies incorporating user feedback on electronic mobility aids showed that users perceived their travel to be safer, with increased comfort and less stress when using the electronic travel devices. This could allow users to receive more detailed information on the direction of the detected object, which some users felt would be useful. However, this would increase the cost of the device and would take longer to learn, defeating the primary aim of the ETA.

Schirmer et al. (2015), stated that the low-cost electronic device was able to convey information to the user about their surroundings to assist with effective navigation through a mobility course, the tactile feedback provided by the sensor

changed how participants navigated the area. Carrington (2017), stated that majority of participants hit fewer obstacles and covered less distance with the cane when the electronic device was attached, often pausing before the cane made contact with an object on the course. Many participants found navigating with the electronic device easier than with the mobility cane alone. The author stressed that, it is anticipated that with daily use, the combination of the mobility cane with the electronic device would offer blind individuals an additional mobility aid so that they would be able to move more confidently in their surroundings. Williams et al. (2013), stated that mobility cane has made it the most generally useful mobility tool for people who are blind.

Rosenberg et al. (2013), said that the mobility cane after contacting the walking surface, no matter how it moved about, the cane would not be able to warn a cane user of all potential trip and fall hazards and obstacles. The constant touch cane technique is where a user's cane tip is moved left to right as the person walks, with the tip always on the ground. This cane technique is the most reliable for detecting drop offs, but the swinging of the cane left and right can allow it to miss obstacles (Wall et al., 2019). From the above discussion the mobility cane alone cannot give full safety, confidence and enough assistance. For the mobility cane to be more effective the electronic device should be attached to it and there should be serious orientation and mobility training in the school. Orientation and mobility instruction must be given immediate attention to enable mobility trainers to offer the needed assistance to students with visual impairment. McGregor (2014) stated that, approximately 80% of learning occurs through vision.

Chan et al. (2020), stated that, without the richness of information provided by typical vision, the development of the child with a visual impairment can be adversely affected across many domains. They stressed further that this developmental

difference occurs as a result of the limited extent and frequency of experiences with the environment, including interactions with family members and peers. Agesa (2014), wrote that children with visual impairment have decreased opportunities for incidental learning and are less likely to gather complete sensory information to interpret the world around them and make sense of their surroundings.

Small et al. (2012), stated that learners with visual impairment have limited range and variety of experiences, and often lack control over their environments and themselves in relation to it by relying solely on their other senses. Therefore, they often miss vital information about their surroundings. Yamins and DiCarlo (2016), explained that the visual system allows individuals to make sense of their world through the collection, organization, and interpretation of the sensory information it processes and lack of clear visual input can lead to variations in development and the extent of learning that occurs.

### **2.8.2 Challenges associated with the independent travel techniques**

Bar-Hen-Schweiger and Henik (2020), noted that in sighted children, concepts such as object permanence, object constancy, cause and effect, and categorization develop through infants with the use of vision as they interact with their environments. Fessakis et al. (2013), asserted that without active participation in specific learning experiences targeted to develop these concepts, children with visual impairments may not develop the abstract thinking skills that lead to the understanding of their own influence and control over their environments. Bishop (2014), concluded that the presence of a visual impairment can impede the understanding of specific concepts, including identification of objects, the relationship of objects in the environment, auditory comprehension and analysis skills, the use of

language and communication and the academic skills learned in school, such as literacy, mathematics, and use of reference materials.

Bekoe (2018), posited that, in Ghana the 2010 Population and Housing Census estimated the country's disability rate to be at 737,743 (which represents 3% of the entire population). WHO (2014), showed that visual impairment is the most prevalent impairment type in Ghana, affecting about 1.2% of the population from Ghana Statistical Services [GSS], 2012. This is a huge number and should not be taken for granted. Learners with visual impairment depend on the use of the various techniques, like the independent travel technique in orientation and mobility in accessing the learning environment. In order to access the environment around them and gain purposeful movement, students with visual impairment must develop appropriate mastery levels in independent travel technique. Gutman and Schoon (2013), stated that the acquisition of independent travel skills is essential for students' participation in academic, non-academic, and extracurricular aspects of education, as well as fostering self-esteem, and social and economic independence. Jurmang (2015) found out that individuals with visual impairment have limitation familiarizing themselves with the learning environment. They have to be taught how to move around, a skill which is almost automatic for sighted people but orientation and mobility skills will enable individuals with visual impairment to move independently.

Lowry et al. (2012), asserted that the significance and immediate impact of visual impairment is the restriction on one's ability to travel through physical and social environments and to anticipate and exercise control over potentially hazardous situations. This explains many of the misconceptions and prejudices about people with blindness. Unless an early intervention is provided to address this issue, it can

result in a life of dependency and exclusion among children with blindness (Holmes, 2020).

Lam and Yeoh (2019), noted that the capacity to travel independently is imperative for the feeling of autonomy. It empowers them to move about freely and autonomously in indoor and in outdoor settings. It allows them more opportunity and makes them less dependent on relatives and friends. It sharpens the remaining senses through sensory training, develops coordination of movement and improves posture. Van der Kolk (2017), said that, many individuals with visual impairment, for a variety of reasons, are unable to achieve that goal on their own. The society must ensure that each member will have that opportunity and that the acquisition of that knowledge was not left to chance (Attia, 2018).

Arslantekin (2015), concluded that some environments cause serious orientation problems to persons with visual impairment. Travelers with visual impairment depend on well-defined paths and memorable landmarks to find their way; poorly defined environment may be difficult to orient students with visual impairment there. Similarly, persons with visual impairment depend on their cognitive maps, environment that are hard to represent mentally are also hard to orient students there. (Nazareth et al. 2018). A simple building plan, such as a square, is likely to be understood and is generally simple to form a mental picture. A complex building with many turns or curves may be very difficult to orient students with visual impairment there (Frederick, 2007). Ocloo (2011), observed that the layouts of school environments for students with visual impairment do not facilitate easy mobility of the pupils. It is common to see individuals falling into gutters, and bruising the sheens of their legs. This actually impinges on their confidence and desire to go on independent travel or indulge in mobility training lessons.

### **2.8.3 Challenges associated with the human guide techniques**

The human guide technique is a technique whereby a sighted person or companion guides or leads a person with visual impairment when moving about (Moodley, 2015). This technique has a lot of skills or ways which need to be taught to the person with visual impairment and the guide (Campbell & DeJong, 2005). The issue is that, the sighted guide does not see the need to go through training before they can assist the visually impaired so they always make mistakes in the process. Goldschmidt (2018), specified that the students with visual impairment had less knowledge on orientation and mobility as well as the guide so it makes it difficult for the student with visual impairment to have trust in the human guide. Rector et al. (2018), observed that, establishing contact with the individual with visual impairment, either verbally or physically, is the most appropriate point to start the process of human guide technique. With this the individual with visual impairment becomes acquainted with the human guide to promote trust. The individual with visual impairment grasps the human guide's arm lightly above the elbow. In the case of a child, or small person, the wrist or hand may be preferable. In most cases, both visually impaired and the guide hold hands which should not be supposed to be so, the visually impaired should be behind the guide to prevent him or her from danger.

Some people, however, prefer holding hands instead of grasping the guide's arm just a little above the elbow. The guide's arm can be across the body movement so that it can be picked up easily by the person with visual impairment with this skill if the guide is not aware, it becomes difficult for the student with visual impairment. In setting off, the guide should be half a step ahead of the blind person (Bischof, 2008). This technique is important because if the guide is not half a step ahead of the blind it is likely for the blind to bump into an object or obstacle, this is enough reason

for both of them to learn the skills. As a guide, check whether the client's left shoulder is behind the guide's right shoulder (or vice versa). Most of the blind cannot walk freely because of lack of this technique. Walk on the flat or level area to be given with plenty of assurance. It is also important to walk at an appropriate speed for the blind person. When walking let the client gain information about the environment to instill confidence in the person with visual impairment (Parimag, 2018). If the human guide does not have all these skills, then it becomes difficult to lead a person with visual impairment.

The development of social and emotional skills occurs through a child's interaction with others. The learner's lack of personal experiences and participation with family and peers can negatively affect the development of social and emotional skills, particularly for a child with visual impairment (Bischof, 2008). This deficit includes development in the areas of knowledge of self, knowledge of others, interactions with others, self-advocacy, and recreation and leisure. A child with visual impairment may neglect to initiate contact with others or engage in social situations, resulting from an unawareness of social cues and decreased opportunities for social engagement (Işlek, 2017).

Many children with visual impairments are socially affected by the limited experiences available for interaction with peers (Pinquart & Pfeiffer, 2011). For children with visual impairments, acceptance from peers can be hindered as a result of unusual behaviours or mannerisms, such as rocking and eye poking (Emerson & Einfeld, 2011). Again, the lack of social engagement by the child with visual impairment can affect the way they access the learning environment (Salleh & Zainal, 2010). This situation can lead to further isolation and reduction in the possibility of



opportunities for practice with social and emotional skills (Steptoe, Shankar, Demakakos, & Wardle, 2013).

## **2.9 Summary of the Literature Review**

The present study reviewed literature on the theoretical framework that supports the concept of orientation and mobility training programme for students with visual impairment. The conceptual framework emphasizes on students' competence in orientation and mobility training and mastery control of the environment. The skills in orientation and mobility enable students to become confident and able to travel independently in their environment. The concept of orientation and mobility training was supported by the conscious competence matrix which talks about the competent level of student with visual impairment to function and fully participate in the society. Effective training in orientation and mobility should be required for students with visual impairment to enable them access their learning environment. Also, the areas the study reviewed were: The concept of orientation and mobility, the concept of visual impairment, students' competence in using the mobility cane. The researcher indicated the difficulties students with visual impairment exhibited using the mobility cane by bumping into obstacle and being exposed to danger, unavailability of the mobility cane.

The gaps the research sought to address were how the students would have confidence using the mobility cane. Again, constant training on the use of mobility cane would help develop student interest and the need to use the mobility cane and availability of the cane from donors and philanthropies. Students competence in applying the independent travel techniques, the challenges students faced in applying the techniques involved in the independent travel was lack of confidence, the gap the research sought to address were to reduce the dependence of students with visual



impairment on their sighted counterpart by giving them regular training on orientation and mobility techniques by the school to equip students to have interest and confidence in applying the techniques involved in the independent travel to enable them access information in the school. Students' competence in using the human guide technique, the literature indicated that both the human guide and student with visual impairment had less training on orientation and mobility which would be difficult for students with visual impairment to use the human guide to achieve safety. The gap the research sought to address would be constant training on orientation and mobility techniques to enable the student with visual impairment offer basic training to the human guide to enable students with visual impairment to use the human guide to achieve safety and to develop confidence in the human guide. Other researchers also indicated that pupils had concerns on orientation and mobility training in their schools. The issue of orientation and mobility had been a problem and hence the need to assess the competence of students with visual impairment in using orientation and mobility techniques in their learning environment.

## CHAPTER THREE

### METHODOLOGY

#### 3.0 Introduction

This chapter describes the research methodology. It specifically looked at the study area, research approach, research design, population, sample, sampling technique, methods of data collection; procedure for data collection; data analysis and presentation; reliability and validity; and ethical considerations.

#### 3.1 Research Approach

A mixed research strategy was adopted to guide the study. According to Yeamin and Rahman (2012), the decision of a researcher to adopt a mixed methods strategy is largely motivated or influenced by the research questions posed, which are directed at describing, explaining, observing, verifying and drawing a conclusion, which combined both quantitative and qualitative strategies. The quantitative method allows the researcher to obtain objective information while qualitative research approach, on the other hand, presents a means of interacting with the relevant participants to obtain subjective information, such as feelings, experiences, and opinions (Zohrabi, 2013).

In this study, interview documents were analyzed qualitatively while observational checklists were analyzed quantitatively. The researcher analyzed the quantitative data first, followed by the analyses of the qualitative data. Mixed method approach was used for this study as data from one resource would not be enough and the initial results need to be further explained. Teddlie and Tashakkori (2003) explained that the use of mixed method approach is particularly valuable in educational research where the researcher needs to address multiple questions. Also, a

mixed approach allowed the researcher to test participant's ability in orientation and mobility techniques. It helps the researcher to gain complementary results by using the strengths of one method to improve the other.

### **3.2 Research Design**

The study employed a sequential explanatory design to investigate the competency of students with visual impairment in using orientation and mobility techniques in accessing their learning environment. Hamann and Suckert (2018) specified that in sequential explanatory design, the researcher first conducts quantitative research, analyzes the results and then builds on the results to explain them in more detail with qualitative research. It was considered explanatory because the initial quantitative data results were explained further with the qualitative data. The sequential explanatory design permitted the researcher to discover that quantitative and qualitative strands occur across sequential phases and research questions from the later strand depend on the previous one. Again, it was also considered sequential because the initial quantitative phase was followed by the qualitative phase. In sequential explanatory design, the researcher establishes two phases: Phase one involves the collection and analysis of quantitative data while phase two employs qualitative methods to elaborate on the results of the quantitative phase.

In this study, the follow-up or explanations model was used. This was where quantitative data from Phase 1 (research questions 1,2 and 3) were collected and analyzed before the collection and analysis of Phase 2 (research questions 4). Creswell et. al. (2011), explained that in sequential explanatory design, point of interface is a point where the two strands are mixed or compared. In the current study,

the point of interface occurred at the discussion of the results where results from both quantitative and qualitative methods were compared.

### **3.3 Population**

The population of a study is the total of the entities which is of interest to a researcher. Population of a study may include people, objects, and institutions which were the objects of the study. Creswell (2005) stated that a population refers to group of humans selected for a study. The population of the study was all the 40 students with visual impairment at the Wenchi Senior High School. The targeted population was chosen because students with visual impairment acquired orientation and mobility training at the lower level of their educational journey. The researcher expected the students at that level to have knowledge about orientation and mobility.

### **3.4 Sample Size**

The sample is usually the subset of the entire population of interest to the researcher (Seawright & Gerring, 2008). Thirty-five students with visual impairment at Wenchi Senior High School were sampled for the study. The remaining five at the time the researcher visited the school for data collection three of them were sick and were on medical treatment and the other two were not regularly available in the school and therefore could not be included in the data collection. Nine of the students were below 15 years, seventeen students were within the age range of 15-18 years of age, and the remaining nine students were above 18 years of age. There were 22 males and 13 females. The 35 participants included students with low vision and students who were blind from JHS 1, JHS 2 and JHS 3.

### **3.5 Sampling Technique**

A purposive sampling technique was used. With this technique, the researcher chose the sample based on who was appropriate to provide the relevant information to achieve the research objectives. Purposive sampling the researcher intentionally select informants based on their ability to elucidate a specific themes, concepts or phenomenon. The students were chosen because it was deemed that they had attained some degree of mastery in the mobility cane techniques, independent travel techniques, and human guide techniques. The researcher selected all the students based on their willingness and determination to participate and answer the research questions. The researcher targeted all the students with visual impairment because they all qualify to provide the best information to the research questions.

### **3.6 Research Instrument**

Research instrument used to gather data for this study was adopted observational checklist for orientation and mobility skills from Michigan State University. The students were scored based on their performance in demonstrating orientation and mobility skills in line with the model adopted for the study and the reliability co- efficient was 0.973 which is higher than the 0.70 which is accepted in social sciences and in-depth interview guide which concentrated on the focus group interview.

#### **3.6.1 Observational checklist**

An observational checklist was designed to collect data from students with visual impairment for the study. The observational checklist was adopted from the Michigan State University (Klump & Burt, 2006). Observation checklist is a list of questions an observer needs to answer when they are observing and assessing an

individual (Takala et al., 2010). The researcher observes and assessed the students as they demonstrate the questions in various techniques in orientation and mobility. Disher (2019) expressed that observational checklist enables the researcher to easily monitor and assess skills in real-times. The researcher was able to monitor and score students on the skills in real-times, the observation checklist was in a form of the GES grading system ranging from a. Excellent (80% and above) = b. Very good (70%-79%) = c. Good (60%-69%) = d. Average (50%-59%) = e. Bad (40%-49%) = f. Very bad (39% and below). (Appendix B.) Observation checklist assists the researcher to identify skills gaps and problem areas to further improve teaching strategies in the classroom setting and student learning development. Paredes-Chi & Viga-de Alva (2020), also stated that observation enables the researcher to gather information on physical setting, and on the programme of the study. The observation took two different forms; namely, non-participatory observation and participatory observation. The non-participatory observation is whereby the researcher does not involve himself or herself in the activities of the group being observed (Harvey, 2012). The status of the observer was not known, and the researcher makes no attempt to get involved in the activities of the group being observed (Moyles, 2002).

An observation and assessment were applied by the researcher during mobility activities by the students to find out and consolidate the evidence of the problem and students' level of comprehending basic orientation and mobility skills. This was consistent with the concern of Pianta and Hamre (2009), who stated that, some characteristics of behavior like interaction between teacher and pupils be observed naturally as they occur. In participatory observation, the researcher aims at becoming part of the group of individuals being observed. Riva (2002), noted that observation involved not only a physical present and sharing of life experience but also entry into

their social and symbolic world by learning their social conviction and habit, their use of language and their non-verbal communication. This was applied during orientation and mobility practices with the student to elicit difficulties involved in orientation and mobility by students with visual impairment. This was done through interaction with students to look out for evidence of the problem. Huang and Lau (2020) also stated that observation is suitable for assessing competencies of some established skills. It is not limited to the visual sense alone but to the sense of hearing, smell, taste and touch. They continued that unobtrusive observation is recommended.

### **3.6.2 Interview guide**

Interview is a way of having verbal interaction with participants when conducting research. It could be described as a form of conversation where one participant asks question and the other provides answers. An interview guide is a list of the high-level topics that researcher plan on covering in the interview with the high-level questions the researcher wants the participants to answer under each question. It could be structured, semi-structured or unstructured (Cachia & Millward, 2011). Semi-structured interview guide was used to obtain in-depth information on the opinions of the respondents since the researcher had the opportunity to clarify questions that were not understood, and probed further in case of an incomplete answer. This encouraged participants to speak out so that the researcher can learn what the range of views of participants is, in order to generate facts of individual experience (Tuli, 2010).

The researcher adopted focus group interactions to elicit data for the study for students with visual impairment. Focus group interview is a face-to-face encounter with the researcher and the participants with the focus on finding out participants perspectives on their lives, experiences or situations (Korstjens & Moser, 2018). The

focus group is typically seven to ten people who are unfamiliar with each other. These participants were selected because they have certain characteristics in common that relate to the topic of the focus group (Smith, Mahdavi, Carvalho, Fisher, Russell & Tippett, 2008). The researcher limited each group to seven learners and in all there were five groups. The time allocated for each group was twenty-five minutes because the learners had other activities to perform in the school. The time was enough for the learners to answer all the questions. In the interviews, the researcher included probes and prompts to aid further exploration of his own line of questioning. The probes and prompts helped to explore and develop views of respondents and to prevent respondents from going off the main line of questioning (Bowling, 2005).

The items were designed and reflected on the key issues raised in the research questions to establish the competence level of students with visual impairment in the use of orientation and mobility techniques.

### **3.7 Procedure for Data Collection**

The researcher obtained a letter of introduction from the Head of the Department of Special Education, UEW, (Appendix A) that explained the research focus, addressed to the authorities of Wenchi Senior High School, for permission to conduct the study. Upon receiving permission, the researcher visited the school to collect data from the students. A pre-visit was made by the researcher to the school to explain the purpose of the study to participants. Participants were assured of the necessary confidentiality of information to be gathered and to book appointments with them. The observational checklist and interview guide were administered by the researcher, and was assisted by the school's resource persons. Each participant was allowed to express their feelings and experiences without undue pressure. Each interview was conducted in the English Language and recorded with a videotape



device, which was later translated into Microsoft Word. The resource teachers were given a 30-minute briefing on the data collection procedure, and with the assistance of the resource teachers, the same briefing on the data collection procedure were done for the students. This was deemed necessary because the researcher believed that, the students were very familiar with the voice of the resource teachers, and would be more obliged to follow the guidelines and rules issued as he took them through the test. However, the researcher clarified issues where necessary in explaining questions to students. Each session lasted for one hour, thirty minutes, from 9:00am to 10:30am, over a period of 30 days.

### **3.8 Validity and Reliability of the Observational Checklist**

A pilot study was conducted with 14 students with visual impairment from Okuapeman Senior High School. The 14 students comprised of 6 males and 8 females. The pilot study was conducted for one hour, thirty minutes in the morning starting from 8:00am to 9:30am. An observational checklist for orientation and mobility skills was administered to the students with visual impairment by the researcher and was assisted by resource teachers of the school. The researcher involved the resource teachers to assist in the data collection process. The reason being that the resource teachers voice would be very familiar and clearer to the students with visual impairment. The data collected from the pretest was analyzed using the Statistical Product and Services Solution (SPSS) and the Cronbach's Alpha. The reliability coefficient of the instrument was .973. Diedenhofen and Musch (2016) stated that the standard Cronbach's Alpha values ranging from 0.67 to 0.70 are good while the value above 0.80 can be considered very good. The internal consistency of items in the test instrument was highly reliable this means that the coefficient level was high for the instrument to be used.

Table 1: Cronbach's Alpha for validity and reliability statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	No. of Items
.973	.953	9

The reliability scale (Cronbach's Alpha values) for the factors identified was .973 (see Table 1), higher than the 0.70 which is generally accepted in social science research. Therefore, the instruments could be said to be relevant and reliable in measuring what they were supposed to measure.

### 3.9 Trustworthiness of the Interview Guide

Trustworthiness of a study refers to the degree of confidence in the data, interpretation, and method used to ensure the quality of a study (Anney, 2014). Several criteria for trustworthiness exist, but the best-known criteria are credibility, transferability, dependability, and confirmability (Korstjens & Moser, 2018). Credibility strategies used included prolonged engagement, persistent observation, member checks, and triangulation. Triangulation was used to ensure the credibility of the study. Triangulation in research could be seen as the use of more than one approach in investigating a research question (Heale & Forbe, 2013). The objective was to increase confidence in the findings through the confirmation of a proposition using two or more independent measures (Caceres & Paparoidamis, 2007). The combination of findings from two or more approaches provide more comprehensive picture of the result rather than one approach could do (Salanti, Ades & Ioannidis, 2011).

Triangulation could be associated with research methods and designs, however there were several variations on the term triangulation. The author stress that, triangulation would be seen as the use of multiple theories, sources of data, methods or investigators within a single phenomenon (Hussein, 2009). This was originally introduced in qualitative research in the 1950s as a way of avoiding potential biases which could arise from the use of a single methodology (King, 2013). This technique was used to confirm suggested findings and it can also be used to determine the completeness of data. Triangulation could be used to describe research where two or more methods were used, known as mixed methods. Combining both quantitative and qualitative methods to answer a specific research question may result in one of the following outcomes (1) the result may converge and lead to the same conclusion. (2) the result may relate to different objects or phenomena but may be complementary to each other and used to supplement the individual result. (3) the results maybe divergent or contradictory. Converging results aim to increase the validity through verification; complementary result highlights different aspects of the phenomenon or illustrate different phenomenon and divergent findings can lead to new and better explanations for the phenomenon under investigation (Kelle, 2005).

To ensure the trustworthiness, responses from the interview were recorded and played to respondents to listen immediately after the interviews were conducted to make sure what were recorded were really the respondents' views. Again, the interviews were conducted in the natural setting of the participants' resource room in the school. Simpson (2018), indicated that participants' in-depth interviews need to be conducted in the natural setting to reflect the reality of life experiences more accurately than do laboratory settings. The researcher stated that result of the study

had to be generalized from the sample to the population and also the instrument could accurately assess what the study intended to assess.

The use of observational checklist and interview guide in this study allowed for method triangulation. Method triangulation is a method of cross-checking data from multiple methods of data collection (Ndanu & Syombua, 2015). The use of triangulation in this study, increased the validity of the results in the sense that the researcher verified the result from the interview guide to the results from the observational checklist to establish the fact, that the challenges the students with visual impairment exhibit during the observational data collection were the same challenges the students reported during the interview data collection and the result indicate that there were a lot of similarities in both data results, that shows that the data from the interview guide can be said to be valid and reliable.

### **3.10 Ethical Consideration**

For ethical clearance, the researcher ensured that the students who participated in the study did so voluntarily without any form of coercion. To guarantee their confidentiality, the researcher did not ask students to provide data that revealed personal identity. The rights of participants and other parties involved at every stage of this study were particularly treated with utmost care. The following considerations were made to promote and protect the rights and interests of participants at the different stages of the study. As a procedure to gain access to the school, an introductory letter from the Department of Special Education at UEW was presented to the authorities of the school. Parents of the students were informed at a P.T.A. meeting. The researcher told the participants their right to participate voluntarily or withdraw from the study at any stage, if they deemed it appropriate to do so. Anonymity and privacy of participants were guaranteed. The researcher explained to

participants the purpose of the study, the risks and benefits of the study before they voluntarily signed the letters of informed consent. Participants were also verbally assured that there would be confidentiality in the handling of any data obtained from them.

### **3.11 Data Analysis and Presentation**

The data generated from the observational checklist were coded and entered into the Statistical Package for Social Sciences (SPSS, 21.0) for analysis. The findings were presented using descriptive statistics like frequency tables, and standard deviations. The transcribed data from interviews were analysed thematically. That is, key themes were identified in the conversations and these were drawn and discussed in relation to the literature review. This was done using both the narrative method and opened-ended responses from interviews.

#### **3.11.1 Data analysis**

The analysis of the data was done by first analysing the observational checklist, followed by the analyses of the interview.

#### **3.11.2 Analysis of the observational checklist data**

Data obtained from the observational responses of the observational checklist were coded and analysed quantitatively using the Statistical Package for Social Sciences version 21.0 (SPSS, 21.0), and descriptive statistics were calculated to obtain the frequency and percentage for each item-by-item analysis which was used to simplify the data.

### **3.11.3 Analysis of the interview data**

The interview data were transcribed based on the code for each interview. The thematic contents were formulated based on the research questions and the data gathered were grouped and analysed under each thematic content, and then discussed with the findings of other related studies. Participants' verbatim responses were also used, where necessary.



## CHAPTER FOUR

### RESULTS

#### 4.0 Introduction

This chapter presents the findings from administering the observational checklist and in-depth interview guide of the SHS students with visual impairment at Wenchi Senior High School. The findings are presented under sub-themes in line with the research objectives. The chapter is divided into six parts. These include the demographic characteristics of respondents, orientation and mobility training at Wenchi Senior High School, the mobility cane technique, students' competencies in the use of independent travel technique, human guide technique and challenges associated with the use of the orientation and mobility techniques among students with visual impairment at Wenchi Senior High School.

#### 4.1 Demographic Characteristics of Students

This section discusses the demographic characteristics of the students in SHS one, two and three with visual impairment at Wenchi Senior High School to give an overview of the characteristics of respondents in the study. The parameters discussed include age and gender of students.

##### 4.1.1 Age of students

Table 2 shows that out of thirty-five students with visual impairment at Wenchi Senior High School, seventeen respondents (48%) were within the age range of 15-18 years. Nine respondents (26%) were below 15 years while the remaining nine respondents (26%) were aged above 18 years.

Table 2: Age distribution of the participants

Age (Years)	Frequency	Percent (%)
Below 15	9	26
15-18	17	48
Above 18	9	26
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Field survey, 2019

#### 4.1.2 Gender of students

Table 3 shows that there were more male students than female students in each class. Out of a total number of thirty-five respondents, twenty-two (63%) were males while their female counterparts were thirteen (37%).

Table 3: Gender of students with visual impairment at Wenchi Senior High School

Gender	Frequency	Percent
Male	22	63
Female	13	37
<b>Total</b>	<b>35</b>	<b>100</b>

Source: Field survey, 2019

#### 4.2 Orientation and Mobility Training at Wenchi Senior High School

Before data collection, the researcher was informed by the Resource Teachers that the school organizes orientation and mobility training for newly-admitted first year students to help them access their learning environment. The mobility canes were provided by philanthropists within and outside the country. The findings showed that students who were in SHS One, Two and Three were introduced to orientation and mobility in the first year of their programme of study. They were taught once every year and the duration for each practice was one hour. Observations from the resource



room confirmed that they used the rigid canes. Most of the students complained of challenges with the use of the rigid cane, independent travel techniques and the human guide. The use of the mobility cane, the use of independent travel techniques and the use of the human guide enable individuals with visual impairment to interact with one's environment the same way a sighted individual would.

#### **4.3 Research Question 1: How competent are students with visual impairment in the use of the mobility cane techniques in accessing their learning environment at the Wenchi Senior High School?**

Mobility cane skills, per this study, were understood as the ability of the students with visual impairment to accurately and consistently access the learning environment whilst using the correct cane techniques. To achieve this, the researcher tested the students on three dimensions of cane techniques and these include; grip and positioning of the cane; ability to swing the cane in movement by observing the touch point technique and identification of obstacles and objects. A practical test of using the mobility cane was applied to all students and scored according to the standard skills in orientation and mobility and in line with the theoretical framework adopted to guide the study. The conscious competence learning model which has four stages or levels of learning was used.

The first stage is called unconscious incompetence which explains the level whereby the learner is not aware of the existing skill and not see the need to learn the skill. The second stage is called conscious incompetence stage which explains as the level whereby the learner becomes aware of the skill and tries to learn the skill. The third stage is called conscious competence which explains the level whereby the learner has acquired the skills and able to demonstrate the skill but the learner is unlikely to explain the skill to others. The last stage is called the unconscious

competence here the skill is seen as automatically nurtured among the learner, this is because the learner has acquired the skill and able to demonstrate and explain the skills very well.

#### 4.3.1 Students' competence in the grip and position of the mobility cane

**Table 4: Ranking of students on grip and position of the mobility cane**

	Excellent	Very good	Good	Average	Bad	Very bad	Total
The student holds the mobility cane with the thumb in front of the top of the handle	1 (3%)	8 (23%)	6 (17%)	5 (14%)	10 (29%)	5 (14%)	35 (100%)
The student holds the mobility cane with the forefinger fully extended on the cane	0 (0%)	4 (11%)	7 (20%)	10 (29%)	14 (40%)	0 (0%)	35 (100%)
The student holds the mobility cane with the second finger curled behind the cane to support it	15 (43%)	8 (23%)	12 (34%)	0 (0%)	0 (0%)	0 (0%)	35 (100%)
The student holds the mobility cane with the last two fingers relaxed.	2 (6%)	13 (37%)	11 (31%)	9 (26%)	0 (0%)	0 (0%)	35 (100%)
The student holds the mobility cane with the hand pointed towards the middle of the body in front of the navel	4 (11%)	8 (23%)	13 (37%)	8 (23%)	2 (6%)	0 (0%)	35 (100%)

Source: Field survey, 2019

From Table 4, it could be seen that the grip and positioning of the mobility cane was measured based on five basic skills. The observation was done on the school football park. The first skill was, the student holds the mobility cane with the thumb in front of the top of the handle. The researcher observed each student five times on the skill, and one (3%) of the students was able to score excellent on the skill, based

on the conscious competence matrix. This student was judged as having attained unconscious competence stage, which is the stage four of the conscious competence matrix. Those who scored very good were eight (23%) students and because their performance was also remarkably high, they have attained conscious competence stage that is stage three. In addition, six (17%) students were good on the skill and were judged to be within the conscious incompetence stage that is stage two while five (14%) students performed averagely on the skill and were perceived to be within the unconscious incompetence level that is the first stage. Ten (29%) students scored bad and five (14%) students scored very bad. Fifteen (43%) students out of thirty-five (100%) students with visual impairment were able to perform the skill. Five (14%) students who scored average had less interest in the skill and fifteen (43%) students who scored bad and very bad respectively had no idea about the skill.

The second skill was, the student holds the mobility cane with the forefinger fully extended on the cane. Each student was observed five times on the skill by the researcher and no student scored excellent. Four (11%) of the students scored very good and were considered to be on the conscious competent stage while, seven (20%) students scored good and were judged to be within conscious incompetent stage. Ten (29%) students performed averagely on the skill and were perceived to be within the unconscious incompetent stage. Fourteen (40%) students scored bad. In all, eleven (31%) students out of the thirty-five (100%) of the students with visual impairment were able to do the skill. Ten (29%) students who scored average had less interest in the skill and fourteen (40%) students who scored bad had no idea about the skill.

Third skill was, the student holds the mobility cane with the second finger curled behind the cane to support it. Each student was observed five time on the skill by the researcher. Fifteen (43%) students scored excellent and were therefore perceived to have reached the unconscious competence stage, followed by eight (23%) students who scored very good and were judged to be within the conscious competence stage. Twelve (34%) students scored good and were placed on the conscious incompetence level. All the thirty-five (100%) students were able to perform the skill. The fourth skill was, the student holding the mobility cane with the last two fingers relaxed. The researcher observed each student five time on the skill and two (6%) of the students scored excellent and were judged to be placed on the unconscious competence stage. Thirteen (37%) students scored very good and were placed on the conscious competence stage. Eleven (31%) of the students scored good and were judged to be within the conscious incompetence stage. Nine (26%) students scored average and were placed on the unconscious incompetence stage. Twenty-six (74%) students out of the thirty-five (100%) students with visual impairment were able to perform the skill and nine (26%) students who scored average had less interest in the skill.

The last skill which was, the student holds the mobility cane with the hand pointed towards the middle of the body in front of the navel. The researcher observed each student five times on the skill and four (11%) of the students scored excellent and were perceived to be on the unconscious competence stage. Eight (23%) students scored very good and were placed on the conscious competence stage. Thirteen (37%) of the students scored good and were judged to be within the conscious incompetence stage. Nine (26%) students scored average and were placed on the unconscious incompetence stage. Two (6%) of the students scored bad. In all, twenty-five (71%)

students out of the thirty-five (100%) of the students with visual impairment were able to do the skill. Eight (23%) of the student who scored average had less interest in the skill and two (6%) of the students were not able to perform the skill. In conclusion the grip and the positioning of the mobility cane, percentage wise, twenty-two (63%) of the students were able to perform the skills and the remaining thirteen (37%) of the students were unable to perform the skills. Constant practice of the skills will help the thirteen (37%) of the students to develop interest in the skills.



### 4.3.2 Students' ability to swing the cane in movement by observing the touch point technique.

**Table 5: Ranking of students' ability to swing the cane in movement by observing the touch point technique**

	Excellent	Very good	Good	Average	Bad	Very bad	Total
The student swings the cane with the tip touching the ground a little wider than the width of the student's body (the arc)	6 (17%)	8 (23%)	9 (26%)	7 (20%)	5 (14%)	0 (0%)	35 (100%)
The student moves the cane from side to side by the flexion and extension of the wrist with the tip touching the ground lightly at each movement (Wrist movement)	0 (0%)	11 (31%)	5 (14%)	10 (29%)	9 (26%)	0 (0%)	35 (100%)
Simultaneously with the extension of one foot forward, the student moves the cane in the reverse (instep)	2 (6%)	4 (11%)	8 (23%)	13 (37%)	8 (23%)	0 (0%)	35 (100%)
The student lifts the cane tip just clear of the ground as it traverses between two points of contact (rhythm)	9 (26%)	15 (43%)	7 (20%)	4 (11%)	0 (0%)	0 (0%)	35 (100%)
The student holds the cane like the diagonal technique and just touching the ground now and then (one -point - technique)	3 (9%)	5 (14%)	9 (26%)	12 (34%)	6 (17%)	0 (0%)	35 (100%)
The student swings the cane from side to side in front of the body (two-point-technique).	9 (26%)	4 (11%)	9 (26%)	13 (37%)	0 (0%)	0 (0%)	35 (100%)
The student swings the cane from one side to another in front of the body as well as another extra touch to any of the side. (Three-point-technique)	0 (0%)	0 (0%)	5 (14%)	16 (46%)	14 (40%)	0 (0%)	35 (100%)

Source: Field survey, 2019

The ranking of the students' ability to swing the cane in movement by observing the touch point technique was measured based on six basic skills. The observation took place in the school starting from the dormitory to the school dispensary as seen from the Table. The first skill was, the student swings the cane in movement whereby the cane tip touches the ground a little wider than the width of the student body (Arc). The researcher observed each student five times on the skill and it turned out that six (17%) of the students scored excellent and were therefore perceived to have reached the unconscious competence stage. This was followed by eight (23%) of the students who had very good and were placed on the conscious competent stage. Nine (26%) students scored good and were judged to be on conscious incompetent level. Seven (20%) students scored average and were considered to be unconsciously incompetent. Five (14%) students scored bad. In all, twenty-three (66%) of the students out of thirty-five (100 %) students, were able to perform the skill. Seven (20%) of the students who scored average had less interest in the skills. Five (14%) students who scored bad had no idea about the skill.

The second skill was, the student moves the cane from side to side by the flexion and extension of the wrist with the tip touching the ground lightly at each movement (Wrist movement). The researcher observed each student six times on the skill and no student scored excellent whiles, eleven (31%) of the students scored very good and were considered to be on the conscious competent stage. Five (14%) students scored good and were judged to be on conscious incompetent level. Ten (29%) students scored average and were placed on the unconscious incompetent stage. Nine (26%) students scored bad. In all, sixteen (45%) of the students out of the thirty-five (100%) students were able to perform the skill. Ten (29%) students who

scored average were seen as having less interest in the skill. Nine (26%) of the students who scored bad had no idea about the skill.

The next skill was, simultaneously with the extension of one foot forward, the student moves the cane in the reverse (instep). The researcher observed each student five times on the skill and two (6%) of the students scored excellent and were judged to be unconscious competent. Four (11%) students scored very good and were placed on the conscious competent stage. Eight (23%) of the students scored good and were considered to be conscious incompetent. Thirteen (37%) of the students scored average and were judged to be unconscious incompetent and eight (23%) students scored bad. In all, fourteen (40%) of the students out of the thirty-five (100%) students were able to perform the skill. Thirteen (37%) of the students who scored average were seen as having less interest in the skill. Eight (23%) students who scored bad had no idea about the skill.

The next skill was, the student lifts the cane tip just clear of the ground as it traverses between two points of contact (rhythm). Each of the student were observed five time by the researcher and nine (26%) of the students scored excellent and were perceived to have reached the unconscious competent stage. Fifteen (43%) students scored very good and were judged to be on conscious competent level. Seven (20%) students scored good and were considered to be on conscious incompetent level. Four (11%) students scored average and were judged to be on unconscious incompetent level. In all, thirty-one (89%) of the students out of the thirty-five (100%) students were able to perform the skill. Four (11%) students who scored average were seen as having less interest in the skill. The fifth skill which was, the student holds the cane like the diagonal technique and just touching the ground now and then. (One -point - technique). The researcher observed each student five time on the skill and three (9%)



of the students scored excellent and were judged to be unconscious competent. Followed by five (14%) students who scored very good and were perceived to have reached the conscious competent stage. Nine (26%) students scored good and were considered to be conscious competent. Twelve (34%) students scored average and were placed on the unconscious incompetent stage. Six (17%) students scored bad. In all, seventeen (49%) of the students out of the thirty-five (100%) of the students were able to perform the skill. Twelve (34%) students who scored average were seen as having less interest in the skill. Six (17%) students who scored bad had no idea about the skill.

The next skill was, the student swings the cane from side to side in front of the body (two-point-technique). The researcher observed each student five time on the skill and nine (26%) students scored excellent and were judged to be unconscious competent. Four (26%) students scored very good and were perceived to be conscious competent. Nine (26%) students scored good and were considered to be conscious incompetent. Thirteen (37%) students scored average and were placed on the unconscious incompetent stage. In all, twenty-two (63%) of the students out of the thirty-five (100%) students were able to perform the skill. Thirteen (37%) students who scored average had less interest in the skill. The last skill was, the student swings the cane from one side to another in front of the body as well as another extra touch to any of the side (three-point-technique).

The researcher observed each student six time on the skill and no student scored excellent and very good respectively. Five (14%) of the students scored good and were judged to be consciously incompetent. Sixteen (46%) students scored average and were perceived to be unconsciously incompetent. Fourteen (40%) students scored bad. In all, five (14%) of the students out of the thirty-five (100%)

were able to perform the skill. Sixteen (46%) students who scored average had less interest of the skill. Fourteen (40%) students who scored bad had no idea about the skill.

In conclusion, the student's ability to swing the mobility cane in movement by observing the touch point technique showed that eighteen (51%) of the students were able to performed the skills, while seventeen (49%) of the students were unable to perform the skills. The seventeen (49%) of the students call for effective orientation and mobility training in the school which would help to bring out the students' interest in skills in orientation and mobility.



### 4.3.3 Students' ability to use the mobility cane to detect objects and obstacles within their learning environment.

**Table 6: Ranking of Student ability to use the mobility cane to detect objects and obstacles within their learning environment**

	Excellent	Very good	Good	Average	Bad	Very bad	Total
The student is able to Identify Obstacles with Cane without bumping into it.	1 (3%)	4 (11%)	6 (17%)	14 (40%)	10 (29%)	0 (0%)	35 (100%)
Student uses the cane to explore around the detected object to know the side of the object.	0 (0%)	4 (11%)	7 (20%)	15 (43%)	9 (26%)	0 (0%)	35 (100%)
The student uses the echo of the tip of the cane to detect and identify a particular object.	7 (20%)	8 (23%)	11 (31%)	9 (26%)	0 (0%)	0 (0%)	35 (100%)
The student slides or scrapes the underground with the cane to get more detailed information about the kind of underground or dry spots and puddles	4 (11%)	1 (3%)	15 (43%)	10 (29%)	5 (14%)	0 (0%)	35 (100%)
The student is able to shoreline by swinging the cane to touch the wall and swinging it back to the other side	4 (11%)	9 (26%)	5 (14%)	10 (29%)	7 (20%)	0 (0%)	35 (100%)

Field survey, 2019

Students use the mobility cane to detect objects and obstacles was measured based on five basic skills. The observation was done on the school assembly compound. The first skill was, the student is able to identify obstacles with cane without bumping into it. The researcher observed each student five times on the skill and one (3%) of the students scored excellent and was perceived to have reached the

unconscious competent stage. Four (11%) students scored very good and were judged to be on conscious competent level. Six (17%) students scored good and were placed on the conscious incompetent stage. Fourteen (40%) students scored average and were considered to be on unconscious incompetent level. Ten (29%) students scored bad. In all eleven (31%) of the students out of the thirty-five (100%) students were able to perform the skill. Fourteen (40%) students who scored average had less interest in the skill and ten (29%) students who scored bad had no idea about the skill.

The second skill was, student uses the cane to explore around detected object to know the side of the object. The researcher observed each student five times on the skill and no student scored excellent. Four (11%) students scored very good and were judged to be on conscious competent level. Seven (20%) of the students scored good and were considered to be on conscious incompetent level. Fifteen (43%) students scored average and were placed on the unconscious incompetent stage. Nine (26%) students scored bad. In all eleven (31%) of the students out of the thirty-five (100%) students were able to perform the skill. Fifteen (43%) students who scored average had less interest on the skill. Nine (26%) students who scored bad had no idea on the skill.

The next skill was, the student uses the echo of the tip of the cane to detect and identify a particular object. The researcher observed each student five times on the skill and seven (20%) students scored excellent and were perceived to be on unconscious competent level. Eight (23%) students scored very good and were judged to be on conscious competent level. Eleven (31%) students scored good and were placed on the conscious incompetent level. Nine (26%) students scored average and were considered to be on unconscious incompetent level. In all twenty-six (74%) of

the students out of the thirty-five (100%) were able to perform the skill. Nine (26%) students who scored average had less interest in the skill.

The fourth skill was, the student slides or scrapes the underground with the cane to get more detailed information about the kind of underground or dry spots and puddles. The researcher observed each student five times on the skill and four (11%) of the students scored excellent and were perceived to be on unconscious competent level. While one (3%) student scored very good and was judged to be on conscious competent level. Fifteen (43%) students scored good and were considered to be on conscious incompetent level. Ten (29%) students scored average and were placed on the unconscious incompetent level. Five (14%) students scored bad. In all twenty (57%) of the students out of the thirty-five (100%) students were able to perform the skill. Ten (29%) students who scored average had less interest about the skill. Five (14%) students who scored bad had no idea about the skill.

The last skill was, the student is able to shoreline by swinging the cane to touch the wall and swinging it back to the other side. The researcher observed each student five times on the skill and four (11%) of the students scored excellent and were judged to be on unconscious competent level. Nine (26%) students scored very good and were considered to be on conscious competent level. Five (14%) students scored good and were perceived to be on conscious incompetent level. Ten (29%) students scored average and were placed on the unconscious incompetent stage. Seven (20%) students scored bad. In all eighteen (51%) of the students out of the thirty-five (100%) students were able to perform the skill. Ten (29%) students who scored average had less interest in the skill. Seven (20%) students who scored bad had no idea about the skill. In conclusion, seventeen (49%) of the students were able to perform the skills while eighteen (51%) of the students were unable to perform the

skills. This showed that majority of the students had less knowledge in these basic skills which is very crucial in orientation and mobility because the ability of the student with visual impairment to use the mobility cane to detect objects and obstacle shows safety of the student. This called for serious orientation and mobility training in the school.

#### **4.4 Research Question 2: How competent are students with visual impairment in employing the independent travel techniques in accessing their learning environment at the school?**

To measure their competence in relation to how students employ the use of independent travel technique in accessing their learning environment, the students were observed on the following dimensions: students' starting point by squaring off in independent travel technique, students use trailing technique in independent travel, student's ability to use upper and lower body protection in identifying objects and obstacles within their environment, students ability to employ independent travel technique for specific activities in the school environment.

#### 4.4.1 Students' starting point by squaring off in independent travel technique.

**Table 7: Students starting point by squaring off in independent travel technique**

	Excellent	Very good	Good	Average	Bad	Very bad	Total
The student both shoulder and other body parts are in alignment to the edge of the road or shore line.	4 (11%)	2 (6%)	9 (26%)	12 (34%)	8 (23%)	0 (0%)	35 (100%)
The student walks in straight direction.	0 (0%)	8 (23%)	4 (11%)	14 (40%)	9 (26%)	0 (0%)	35 (100%)
The student ability to locate object which is directly in front or in line with another object.	0 (0%)	6 (17%)	9 (26%)	16 (46%)	4 (11%)	0 (0%)	35 (100%)

Source: Field survey, 2019

Students starting point by squaring off in independent travel technique was measured based on five basic skills. The observation took place in the school, the path that led to their dormitory. The first skill was, the student's both shoulder and other body parts are in alignment to the edge of the road or shore line. The researcher observed each student five times on the skill and four (11%) of the students scored excellent and were judged to be on unconscious competent level. Two (6%) students scored very good and were judged to be on conscious competent level. Nine (26%) students scored good and were perceived to be on conscious incompetent level. Twelve (34%) students scored average and were placed on the unconscious incompetent stage. Eight (23%) students scored bad. In all fifteen (42%) of the students out of the thirty-five (100%) students were able to perform the skill. Twelve (34%) students who scored average had less interest in the skill. Eight (23%) students who scored bad had no idea about the skill.

The second skill was, the student walks in straight direction. The researcher observed each student five times on the skill and no student scored excellent. Eight (23%) students scored very good and were perceived to be on conscious competent level. Four (11%) students scored good and were judged to be on conscious incompetent level. Fourteen (40%) students scored average and were placed on the unconscious incompetent stage. Nine (26%) students scored bad. In all twelve (34%) of the students out of the thirty-five (100%) students were able to performed the skill. Fourteen (40%) students who scored average had less interest in the skill. Nine (26%) students who scored bad had no idea about the skill.

The next skill was, the student's ability to locate object which is directly in front or in line with another object. The researcher observed each student five time on the skill and none of the students scored excellent. Six (17%) students scored very good and were perceived to be on conscious competent level. Nine (26%) students scored good and were judged to be on conscious incompetent level. Sixteen (46%) students scored average and were placed on the unconscious incompetent stage. Four (11%) students scored bad. In all fifteen (43%) of the students out of the thirty-five (100%) students were able to perform the skill. Sixteen (46%) students who scored average had less interest about the skill and four (11%) students who scored bad had no idea about the skill. In conclusion, fourteen (40%) of the students were able to perform the skills while twenty-one (60%) of the students were unable to perform the skills. Majority of the students would be in danger so far as skills in independent travel technique is concerned. A lot of effort would be needed in training students on the skills involved in independent travel.



#### 4.4.2 Student ability to apply the skills involve in trailing technique

**Table 8: Student ability to apply the skills involve in trailing**

	Excellent	Very good	Good	Average	Bad	Very bad	Total
Student extend the arm that is closer to the object and the student use the back of his/her fingers to touch the object.	0 (0%)	10 (29%)	8 (23%)	6 (17%)	11 (31%)	0 (0%)	35 (100%)
The student uses the back of the hand to follow the wall, edge of a table, and other similar object.	0 (0%)	12 (34%)	9 (26%)	0 (0%)	14 (40%)	0 (0%)	35 (100%)
The student walks by trailing fingers along the surface of the object towards his destination.	0 (0%)	14 (40%)	5 (14%)	16 (46%)	0 (0%)	0 (0%)	35 (100%)

Source: Field survey, 2019

Student's use of trailing technique in independent travel was measured based on three basic skills. The observation took place in the school resource centre. The first skill was, student extend the arm that is closer to the object and the student used the back of his/her fingers to touch the object. The researcher observed each student five times on the skill and none of the students scored excellent. Ten (29%) students scored very good and were perceived to be on conscious competent level. Eight (23%) of the students scored good and were judged to be on conscious incompetent level. Six (17%) students scored average and were placed on the unconscious incompetent stage. 11(31%) of the students scored bad. In all, eighteen (52%) of the students out of the thirty-five (100%) students were able to perform the skill. Six (17%) students who scored average had less interest in the skill. Eleven (31%) of the students who scored bad had no idea about the skill. The second skill was, the student uses the back of the hand to follow the wall, edge of a table, and other similar object. The researcher observed each student five times on the skill and none of the student scored excellent. Twelve (34%) students scored very good and were perceived to be on conscious

competent level. Nine (26%) students scored good and were considered to be on conscious incompetent level. Fourteen (40%) of the students scored bad. In all twenty-one (60%) of the students out of the thirty-five (100%) students were able to perform the skill. Fourteen (40%) of the students who scored bad had no idea about the skill.

The last skill was, the student walks by trailing fingers along the surface of the object towards his destination. The researcher observed each student five times on the skill and none of the students scored excellent. Fourteen (40%) students scored very good and were perceived to be on conscious competent level. Five (14%) students scored good and were considered to be on conscious incompetent level. Sixteen (46%) students scored average and were placed on the unconscious incompetent stage. In all, nineteen (54%) of the students out of the thirty-five (100%) students were able to perform the skill. Sixteen (46%) students who scored average had less interest in the skill. In conclusion, nineteen (54%) of the students were able to perform the skills while sixteen (46%) of the students were unable to perform the skills. There could be the needed attention in training students on orientation and mobility.

#### 4.4.3 Students' use of the upper and lower body protection technique in identifying objects and obstacles within their learning environment.

**Table 9: Ranking of student using the upper and lower body protection technique in identifying objects and obstacles within their learning environment**

Skill	Excellent	Very good	Good	Average	Bad	Very bad	Total
The student raises the left or the right arm to the shoulder height. (Upper-body protection)	9 (26%)	4 (11%)	9 (26%)	13 (37%)	0 (0%)	0 (0%)	35 (100%)
The student bends the elbow to form an angle of 120 degree and his or her fore-arm is held across in the front of the face. (Upper-body protection)	0 (0%)	3 (9%)	11 (31%)	8 (23%)	9 (26%)	4 (11%)	35 (100%)
The student turned the hand so that the palm faces away from the body and his/her fingers are slightly bent back towards the body. (Upper-body protection).	0 (0%)	5 (14%)	8 (23%)	16 (46%)	6 (17%)	0 (0%)	35 (100%)
The student extends either the left or right arm or move the same position to the middle of the body. (Lower-body protection).	7 (20%)	6 (17%)	7 (20%)	15 (43%)	0 (0%)	0 (0%)	35 (100%)
The student bends the fingers slightly with the palm facing their body. (Lower-body protection).	0 (0%)	4 (11%)	9 (26%)	17 (49%)	5 (14%)	0 (0%)	35 (100%)
The student's arm is held about 10-20 centimeter in front of the body as student moves in this position in the direction desired. (Lower-body protection)	0 (0%)	7 (20%)	10 (29%)	13 (37%)	5 (14%)	0 (0%)	35 (100%)

Field survey, 2019

Students use the upper and lower body protection technique in identifying objects and obstacles were measured based on six basic skills. The observation took place in the school resource centre. The first skill was, the student raises the left or the right arm to the shoulder height. (Upper-body protection). The researcher observed each student five times on the skill and nine (26%) of the students scored excellent and were judged to be on unconscious competent level. Four (11%) students scored very good and were perceived to be on conscious competent level. Nine (26%) students scored good and were considered to be on conscious incompetent level. Thirteen (37%) students scored average and were placed on the unconscious incompetent stage. In all twenty-two (63%) of the students out of the thirty-five (100%) students were able to perform the skill. Thirteen (37%) students who scored average had less interest in the skill.

The second skill was, the student bends the elbow to form an angle of 120 degree and his or her fore-arm is held across in the front of the face. (Upper-body protection). The researcher observed each student five times on the skill and none of the student scored excellent. Three (9%) students scored very good and were perceived to be on conscious competent level. Eleven (31%) students scored good and were considered to be on conscious incompetent level. Eight (23%) students scored average and were placed on the unconscious incompetent stage. Nine (26%) of the students scored bad. Four (11) scored very bad. In all fourteen (40%) of the students out of the thirty-five (100%) students were able to perform the skill. Eight (23%) students who scored average had less interest in the skill. Thirteen (37%) of the students who had bad and very bad scores respectively had no idea about the skill.

The next skill was, the student turned the hand so that the palm faces away from the body and his/her fingers are slightly bent back towards the body (Upper-body protection). Each student was observed five times by the researcher and none of the student scored excellent. Five (14%) students scored very good and were perceived to be on conscious competent level. Eight (23%) students scored good and were considered to be on conscious incompetent level. Sixteen (46%) students scored average and were placed on the unconscious incompetent stage. Six (17%) of the students scored bad. In all thirteen (37%) of the students out of the thirty-five (100%) students were able to perform the skill. Sixteen (46%) students who scored average had less interest in the skill. Six (17%) of the students who scored bad had no idea about the skill.

The fourth skill was, the student extends either the left or right arm and move the same position to the middle of the body. (Lower-body protection). The researcher observed each student five times on the skill and seven (20%) of the students score excellent and were judged to be on unconscious competent level. Six (17%) students scored very good and were perceived to be on conscious competent level. Seven (20%) students scored good and were placed on the conscious incompetent stage. Fifteen (43%) students scored average and were placed on the unconscious incompetent stage. In all twenty (57%) of the students out of the thirty-five (100%) students were able to perform the skill. Fifteen (43%) students who scored average had less interest in the skill. The fifth skill was, the student bends the fingers slightly with the palm facing their body. (Lower-body protection). The researcher observed each student five times on the skill and none of the student scored excellent. Four (11%) students scored very good and were perceived to be on conscious competent level. Nine (26%) students scored good and were considered to be on conscious

incompetent level. Seventeen (49%) students scored average and were placed on the unconscious incompetent stage. Five (14%) of the students scored bad. In all thirteen (37%) of the students out of the thirty-five (100%) students were able to perform the skill. Seventeen (49%) students who scored average had less interest in the skill. Five (14%) of the students who scored bad had no idea about the skill.

Last skill was, the student arm is held about 10-20 centimetres in front of the body as student moves in this position in the direction desired. (Lower-body protection). The researcher observed each student five times on the skill and none of the students scored excellent. Seven (20%) students scored very good and were perceived to be on conscious competent level. Ten (29%) students scored good and were considered to be on conscious incompetent level. Thirteen (37%) students scored average and were placed on the unconscious incompetent stage. Five (14%) students scored bad. In all seventeen (49%) of the students out of the thirty-five (100%) students were able to perform the skill. Thirteen (37%) students who scored average had less interest in the skill. Five (14%) students who scored bad had no idea about the skill.

In conclusion, sixteen (46%) of the students were able to perform the skills while nineteen (54%) of the students were unable to perform the skills. Majority of the students had less knowledge in the skills. There should be more seriousness in the training of orientation and mobility on both the students and orientation and mobility trainers.

#### 4.4.4 Students' ability to employ independent travel technique for specific activities in their school environment

**Table 10: Students ability to employ independent travel technique in their school environment**

	Excellent	Very good	Good	Average	Bad	Very bad	Total
Student use independent travel technique to identify his/her sitting place in the classroom	8 (23%)	0 (0%)	7 (20%)	11 (31%)	9 (26%)	0 (0%)	35 (100%)
Student ability to open a door leading to the resource room using the independent travel technique.	2 (6%)	6 (17%)	5 (14%)	13 (37%)	9 (26%)	0 (0%)	35 (100%)
Student use independent travel technique to locate their teacher's desk.	0 (0%)	3 (9%)	7 (20%)	12 (34%)	9 (26%)	4 (11%)	35 (100%)

Source: Field survey, 2019

Students' ability to employ independent travel technique in their school environment was measured based on three basic skills. The observation took place in the school resource centre. The first skill was, student use independent travel technique to identify their sitting position in the classroom. The researcher observed each student five times on the skill and eight (23%) of the students scored excellent and were judged to be on unconscious competent level. None of the students scored very good. Seven (20%) students scored good and were considered to be on conscious incompetent level. Eleven (31%) students scored average and were placed on the unconscious incompetent stage. Nine (26%) of the students scored bad. In all fifteen (43%) of the students out of the thirty-five (100%) students were able to perform the skill. Eleven (31%) students who scored average had less interest in the skill. Nine (26%) of the students who scored bad had no idea about the skill.

The second skill was student use independent travel technique to locate and open a door. The researcher observed each student five times on the skill and two (6%) of the students score excellent and were judged to be on unconscious competent level. Six (17%) students scored very good and were perceived to be on conscious competent level. Five (14%) students scored good and were placed on the conscious incompetent stage. Thirteen (37%) students scored average and were placed on the unconscious incompetent stage. Nine (26%) of the students scored bad. In all thirteen (37%) of the students out of the thirty-five (100%) students were able to perform the skill. Thirteen (37%) students who scored average had less interest in the skill. Nine (26%) of the students who scored bad had no idea about the skill.

The last skill was, Student use independent travel technique to locate their teacher's desk. The researcher observed each student six times on the skill and none of the student scored excellent. Three (9%) students scored very good and were perceived to be on conscious competent level. Seven (20%) % students scored good and were placed on the conscious incompetent stage. Twelve (34%) students scored average and were considered to be on unconscious incompetent level. Nine (26%) of the students scored bad. Four (11%) of the students scored very bad. In all ten (29%) of the students out of the thirty-five (100%) students were able to perform the skill. Twelve (34%) students who scored average had less interest in the skill. Thirteen (37%) of the students who scored bad and very bad respectively had no idea about the skill.

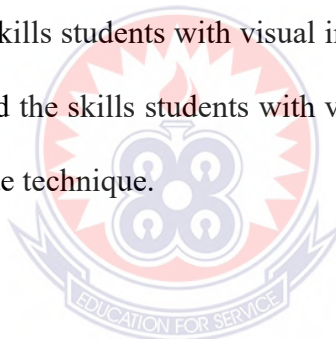
In conclusion, thirteen (37%) of the students were able to perform the skills and twenty-two (63%) of the students were unable to perform the skills. The students had serious challenges with these skills in orientation and mobility. The orientation



and mobility trainers need to encourage the students to had confidents to walk independently.

**4.5 Research Question 3: How competent are the students with visual impairment to use the human guide techniques in accessing their learning environment at the Wenchi Senior High School?**

Human guide technique per this study were understood as the ability of students with visual impairment in using the guide to accessing their learning environment without bumping into objects whilst using correct techniques. To achieve this, the researcher tested the students on three dimensions of human guide techniques and these include; students with visual impairment's ability to use the human guide technique, skills students with visual impairment apply to achieve safety while using the guide, and the skills students with visual impairment apply to sit on a chair while using the guide technique.



#### 4.5.1 Students with visual impairment ability to use the human guide technique?

**Table 11: Students with visual impairment ability to use the human guide technique**

skills	Excellent	Very good	Good	Average	Bad	Very bad	Total
Student with visual impairment ability to create rapport between him and the guide.	10 (29%)	15 (43%)	6 (17%)	4 (11%)	0 (0%)	0 (0%)	35 (100%)
Student able to grasp the guide hand just a little above the elbow.	7 (20%)	5 (14%)	9 (26%)	9 (26%)	5 (14%)	0 (0%)	35 (100%)
Student with visual impairment able to have a half step interval between him and the guide when movement is about to take place.	3 (9%)	5 (14%)	9 (26%)	14 (40%)	4 (11%)	0 (0%)	35 (100%)
Student with visual impairment ability to change his hands by slowing down the speed of movement between him and the guide.	5 (14%)	4 (11%)	10 (29%)	13 (37%)	3 (9%)	0 (0%)	35 (100%)

Source: Field survey, 2019

Students with visual impairment ability to use the human guide technique was measured based on four basic skills. The observation took place in the school environment. The first skill was, student with visual impairment ability to create rapport between him and the guide. The researcher observed each student five times on the skill and ten (29%) of the students scored excellent and were judged to be on unconscious competent level. Fifteen (43%) students scored very good and were perceived to be on conscious competent level. Six (17%) students scored good and

were considered to be on conscious incompetent level. Four (11%) students scored average and were placed on the unconscious incompetent stage. In all thirty-one (89%) of the students out of the thirty-five (100%) students were able to perform the skill. Four (11%) students who scored average had less interest in the skill. The second skill was, Student ability to grasp the human guide hand just a little above the elbow. The researcher observed each student five times on the skill and seven (20%) of the students scored excellent and were judged to be on unconscious competent level. Five (14%) students scored very good and were perceived to be on conscious competent level. Nine (26%) students scored good and were considered to be on conscious incompetent level. Nine (26%) students scored average and were placed on the unconscious incompetent stage. Five (14%) students scored bad. In all twenty-one (60%) of the students out of the thirty-five (100%) students were able to perform the skill. Nine (26%) students who scored average had less interest in the skill. Five (14%) of the students who scored bad had no idea about the skill.

The next skill was, Student with visual impairment ability to walk half a step interval between him and the guide when movement is about to take place. The researcher observed each student five times on the skill and three (9%) of the students scored excellent and were judged to be on unconscious competent level. Five (14%) students scored very good and were perceived to be on conscious competent level. Nine (26%) students scored good and were considered to be on conscious competent level. Fourteen (40%) students scored average and were placed on the unconscious incompetent stage. Four (11%) students scored bad. In all seventeen (49%) of the students out of the thirty-five (100%) students were able to perform the skill. Fourteen (40%) students who scored average had less interest in the skill. Four (11%) of the students who scored bad had no idea about the skill. The last skill was, Student with

visual impairment ability to change his hands by slowing down the speed of movement between him and the guide. The researcher observed each student five times on the skill and five (14%) of the students score excellent and were judged to be on unconscious competent level. Four (11%) students scored very good and were perceived to be on conscious competent level. Ten (29%) students scored good and were considered to be on conscious incompetent level. Thirteen (37%) students scored average and were placed on the unconscious incompetent stage. Three (9%) of the students scored bad. In all nineteen (54%) of the students out of the thirty-five (100%) students were able to perform the skill. Thirteen (37%) students who scored average had less interest in the skill. Three (9%) of the students who scored bad had no idea about the skill.

In conclusion, twenty-two (63%) of the students were able to perform the skills and thirteen (37%) of the students were unable to perform the skills. The data clearly showed that the majority of the students with visual impairment were able to use the guide but there were still good number of the students, who were unable to use the human guide properly.

#### 4.5.2 The skills students with visual impairment apply when using the human guide to achieve safety?

**Table 12: Ranking the skills students with visual impairment apply when using guide to achieve safety**

	Excellent	Very good	Good	Average	Bad	Very bad	Total
The student with visual impairment is able to use the human guide to negotiate narrow space.	10 (29%)	8 (23%)	11 (31%)	6 (17%)	0 (0%)	0 (0%)	35 (100%)
The student with visual impairment can ascend and descend the stairs in the normal way following a step behind the human guide.	1 (3%)	14 (40%)	13 (37%)	7 (20%)	0 (0%)	0 (0%)	35 (100%)
The student with visual impairment can approach and use doors while using the human guide technique.	9 (26%)	12 (34%)	14 (40%)	0 (0%)	0 (0%)	0 (0%)	35 (100%)

Source: Field survey, 2019

The skills students with visual impairment apply when using the human guide to achieve safety was measured based on three basic skills. The observation took place around the school resource centre. The first skill was, the student with visual impairment's ability to use the guide to negotiate narrow space. The researcher observed each student five times on the skill and ten (29%) of the students scored excellent and were judged to be on unconscious competent level. Eight (23%) students scored very good and were perceived to be on conscious competent level. Eleven (31%) students scored good and were placed on the conscious incompetent stage. Six (17%) students scored average and were considered to be on unconscious incompetent stage. In all twenty-nine (83%) of the students out of the thirty-five

(100%) students were able to perform the skill. Six (17%) students who scored average had less interest in the skill.

The next skill was, the student with visual impairment can ascend and descend the stairs in the normal way following a step behind. The researcher observed each student five times on the skill and one (3%) of the students score excellent and were judged to be on unconscious competent level. Fourteen (40%) students scored very good and were perceived to be on conscious competent level. Thirteen (37%) students scored good and were placed on the conscious incompetent stage. Seven (20%) students scored average and were placed on the unconscious incompetent stage. In all twenty-eight (80%) of the students out of the thirty-five (100%) students were able to perform the skill. Seven (20%) students who scored average had less interest in the skill. The last skill was, the student with visual impairment ability to approach and use doors whiles using the human guide technique.

The researcher observed each student five times on the skill and nine (26%) of the students scored excellent and were judged to be on unconscious competent level. Twelve (34%) students scored very good and were perceived to be on conscious competent level. Fourteen (40%) students scored good and were placed on the conscious incompetent stage. All the thirty-five (100%) students were able to perform the skill. In conclusion, thirty (87%) of the students were able to perform the skill while five (13%) of the students were unable to perform the skills. The few students should be serious with orientation and mobility training to enable them use the human guide technique proper to achieve safety.

#### 4.5.3 The skills that students with visual impairment apply to sit on a chair while using the human guide technique

**Table 13: Ranking of the skills that students with visual impairment apply to sit on a chair while using the guide technique.**

Skill	Excellent	Very good	Good	Average	Bad	Very bad	Total
The student with visual impairment can move his free hand to follow the back of the chair down to the seat, if the chair is empty.	7 (20%)	10 (29%)	6 (17%)	12 (34%)	0 (0%)	0 (0%)	35 (100%)
The student with visual impairment moves unaided around to the front while holding the back of the chair.	5 (14%)	9 (26%)	12 (34%)	6 (17%)	3 (9%)	0 (0%)	35 (100%)
The student with visual impairment turns around so that his legs are touching the front of the chair and then sit down.	4 (11%)	11 (31%)	10 (29%)	8 (23%)	2 (6%)	0 (0%)	35 (100%)

Source: Field survey, 2019

The skills that students with visual impairment apply to sit on a chair while using the guide technique was measured based on three basic skills. The observation took place in the school resource centre. The first skill was, the student with visual impairment can move his free hand to follow the back of the chair down to the seat, if the chair is empty. The researcher observed each student five times on the skill and seven (20%) of the students scored excellent and were judged to be on unconscious competent level. Ten (29%) students scored very good and were perceived to be on conscious competent level. Six (17%) students scored good and were placed on the conscious incompetent stage. Twelve (34%) students scored average and were placed

on the unconscious incompetent stage. In all twenty-three (66%) of the students out of the thirty-five (100%) students were able to perform the skill. Twelve (34%) students who scored average had less interest in the skill.

The next skill was, the student with visual impairment moved unaided around to the front while holding the back of the chair. The researcher observed each student five times on the skill and five (14%) of the students scored excellent and were judged to be on unconscious competent level. Nine (26%) students scored very good and were perceived to be on conscious competent level. Twelve (34%) students scored good and were placed on the conscious incompetent stage. Six (17%) students scored average and were placed on the unconscious incompetent stage. Three (9%) of the students scored bad. In all twenty-six (74%) of the students out of the thirty-five (100%) students were able to perform the skill. Six (17%) students who scored average had less interest in the skill. Three (9%) of the students who scored bad had no idea about the skill.

The last skill was, the student with visual impairment turns around so that his legs are touching the front of the chair and then sit down. The researcher observed each student five times on the skill and four (11%) of the students scored excellent and were judged to be on unconscious competent level. Eleven (31%) students scored very good and were perceived to be on conscious competent level. Ten (29%) students scored good and were placed on the conscious incompetent stage. Eight (23%) students scored average and were placed on the unconscious incompetent stage. Two (6%) of the students scored bad. In all twenty-five (71%) of the students out of the thirty-five (100%) students were able to perform the skill. Eight (23%) students who scored average had less interest in the skill. Two (6%) of the students who scored bad had no idea about the skill. In conclusion, twenty-five (71%) of the



student were able to perform the skills while ten (29%) of the students were unable to perform the skills. For the smaller number of students to be able to use the human guide to achieve safety there should be the need for orientation and mobility training.

#### **4.6 Research Question 4: Challenges associated with the various techniques of orientation and mobility that students with visual impairment face when accessing their learning environment at Wenchi Senior High School**

The fourth research question of the study sought to identify some of the challenges faced by the students in accessing their educational environment. As it has been pointed out earlier, the competency of students with visual impairment in accessing their learning environment per this study is viewed in three ways namely, mobility cane techniques, independent travel techniques and human guide techniques. As a result of this the challenges are also grouped under this three main dimension of techniques applied by students in accessing their learning environment at Wenchi Senior High School.

##### **4.6.1 Challenges on the use of mobility Cane techniques**

Most of the students expressed their unique challenges in using mobility cane technique. The challenges highlighted have been categorized under six broad issues namely: the effectiveness of orientation and mobility training, the school environment not disability friendly, the mobility canes in the schools are not enough, the mobility canes in the school are very old, lack of orientation and mobility instructor.

The problem with orientation and mobility technique in the school was the refusal of the school authorities to give students with visual impairment regular training on the techniques involved in orientation and mobility. As a result of that the

students had less interest in orientation and mobility and they found it difficult applying any of the techniques involved in orientation and mobility in their daily activities in the school. In this view some of the students expressed concerned that; *“we only received training on orientation and mobility when we were in first year”*. The emphasis was on the effectiveness of orientation and mobility training given to students with visual impairment for them to be well verse in the skills and enable them to have confidence applying the techniques involved in orientation and mobility for easy access of their learning environment.

In relation to other challenge, the school environment was not disability friendly and the students explained that they found it difficult identifying their starting point, where they are and how they are getting there. There were no land marks and cues for the starting point in the school. They were unimpressed with the fact that there are no guide rays to assist students with visual impairment when using the mobility cane in accessing the corridor of the resource centre to their destination. This is a view of a student in the following expression; *“I have difficulty in identifying my starting point and how am getting to my destination. This is because there were no guide rays to guide us when using the mobility cane in the resource centre”*. It was found that the emphasis was on the school environment which was not disability friendly, there were no universal designs to help these individuals. And this makes them frustrated and limited their desire to use the mobility cane. They raised much concern that the road from their dormitory to the blind resource room is not cemented so they found it difficult to use the cane and this posed a challenge. Some students expressed that, *they face difficulty when using the mobility cane in accessing the road from the dormitory to the resource centre, there are potholes on the way*. They

stressed that the potholes sometimes have stagnant water which at time students with their canes step in it.

Another challenge was not getting the correct length of cane to use. The length of mobility cane should be at the shoulder level of the individual, they said that the mobility canes were too long and therefore found it difficult using it when entering their classrooms and this actually disturbed classroom activities and other school gathering and this limited their desire to use the mobility cane. It was true that consistent practice of the use of the mobility cane helps the users to develop competency in accessing the school environment. In expressing a viewpoint on this, some students stated that; *“At times we become disturbed to send this long cane to the classroom because our colleagues complained about the cane causing danger to them”*.

Most of the interviewees also complained that using the long cane in the classroom disrupts the attention of the students. This was because they always lean it on the wall and it mostly fell down, which creates noise in the classroom.

Another challenge that was raised by the respondents was that the canes in the school are very old. It was well known that the use of the mobility cane comes with an additional benefit of employing the various skills in mobility cane technique to navigate around ones learning environment. However, most of the students indicated that the canes in the school are very old in this view some students indicate that; *we found it difficult to access the handle of the cane, which sometimes gives us cuts and this limits our desire to use it*. It is undeniable fact that using an old cane can bend and frustrate one’s ability to use it. Again, there were not enough mobility canes in the school. Considering the fact that there were only few mobility canes available in the school. The ratio of the one mobility cane to one student with visual impairment

do not tally. These students were left at the mercies of these human guides in the school. Out of this a student said *'I found it difficult to go to the dining hall when no guide is available because the canes are few and when they are shared not every student will get'*. It could be noted that her worry was not the absence of the human guide, but rather the unavailability of mobility canes in the school. The use of the mobility cane would help the students in accessing their learning environment.

Lastly, some interviewees also had difficulty with the resource teachers. The reason was that resource teachers had less time to train students with visual impairment on orientation and mobility, the resource teachers were not trained to be orientation and mobility instructors but had acquired knowledge on orientation and mobility techniques because of that, they would need more time to be able to pass on the skills to the students with visual impairment. One of the students indicated that; *"the resource teachers assumed that all the students with visual impairment had knowledge about orientation and mobility techniques"*. Upon further interaction, some students stated that, we were not trained into details and the time for the training was limited. There should be orientation and mobility instructor in the school to team up with the resource teachers to give effective training on orientation and mobility to students with visual impairment to accomplish positive outcome.

#### **4.6.2 Challenges on the Use of Independent Travel Techniques**

It was noted that almost all the students at Wenchi Senior High School had challenges in employing the independent travel techniques in accessing their learning environment. Their concerns were organized into three namely: difficulty of using shore lining and trailing technique, difficult employing the upper and lower body protection and difficult applying the independent travel technique.

Independent travel techniques enables individual with visual impairment to interact with the environment in the same way a sighted individual could. It was found that, there was difficulty of employing the shore-lining and trailing technique in the school. This was because students found it difficult to drag their feet on the floor because the classroom and dormitory is not tiled but cemented and they feared that they could be hurt while dragging their feet on the floor as it was demanded in the independent travel technique. One student indicated that, *“At times, dragging my feet on the floor gets my shoes removed and I get hurt because the cemented floor is not in good shape”*. Upon further interaction, some students said that the school should improve on the universal designs and tile the classroom and dormitory to suit their needs. The students were therefore limited in employing the trailing technique and there were not enough rays on the stairs for students to trail. Students found it difficult using the back of their hand to trail on the wall of both resource room, dormitory and classroom because they were scared of getting hurt. Some students stated that, *we always get scared to use the back of our hand to trail on the wall because we don't usually do it*. These were some of the reasons why it would be necessary to teach students how to apply the independent travel technique. In trailing one can decide to use the back of the hand to hit the wall continues as the person move to reduce the risk of hurt. Again, lack of confident on the side of the students with visual impairment make it difficult for them to apply the independent travel technique for independent movement in the school environment. Some students indicated that, *“we had not tried to walk alone without assistance from our sighted counterparts”*. From further interaction it was noted that the students do not have the courage to move on their own on the school environment.

Most of the students had the challenge of not able to employ the upper and lower body protection technique. This challenge was faced by a number of students who found it difficult to apply both lower and upper body protection technique at the same time. Some students indicated that, *“we always apply one of the body protections techniques thinking all the body would be protected”*. Upon continuous interaction it was noted that, the students do not constantly practice the technique that was why they always forgot to apply both techniques to protect the full body when the need arose. A student indicated that, *“is not something I do all the time so I always forget to apply both techniques at the same time”*.

#### **4.6.3 Challenges on the use of human guide techniques**

The researcher had indicated the challenges with human guide technique. The challenges highlighted have been categorized under four broad issues namely: the school environment not disability friendly, the sighted colleagues unwillingness to allow themselves to be used as human guide by students with visual impairment, lack of confidence in the human guide by students with visual impairment and some of the human guide take advantage of the students with visual impairment.

In relation to the first challenge- the school environment not disability friendly for students with visual impairment when using the sighted counterpart as human guide. The students with visual impairment found it difficult identifying their starting point because there was no land mark or cues for their starting point. They raised much concern that the road from the dormitory to the resource room is not levelled so students with visual impairment found it difficult using the human guide to access the path especially when approaching a narrow way, it become a challenge. In viewed of this following expression by some students; *“we have difficulty in identifying our starting point with the use of human guide. This was because the road does not*

*support our movement, one can step into stagnate water whiles using the guide*". The emphasis was on the school environment not being disability friendly, there were no universal designs to help these individuals and this makes them frustrated and limits their desire to move from one place to another on the school environment.

Also, another challenge was that at times human guides fail to communicate to students with visual impairment when approaching an object or obstacle. They said that the sighted colleagues fail to communicate to them when movement was on going and this actually disturbs them and make them lose confidence in the human guide because they are likely to bump into objects. Consistent practice of the use of the human guide would develop students' competence in accessing their learning environment. In expressing a viewpoint on this, some students stated that; *"At times we are afraid to walk with a sighted student since they fail to communicate to us and this disturbs our movement..."*.

Another challenge that was raised by the interviewee was that some sighted colleagues were not willing to allow themselves to be used as human guide, because of how the sighted students viewed individuals with disability and how they discriminated against individuals with disability. In view of this one lady stated what her sighted counterpart said, *she found it difficult to move with individuals with visual impairment because of her perception about disability*. It could be noted that her worry was not about walking with individuals with visual impairment, but rather the societal perception and stigmatization.

Lastly, some interviewees stated that some sighted colleagues take advantage of the guiding assistance they give them. The sighted colleagues would ask for something in return for allowing himself to be used as a human guide. In view of this some students indicated that, *"some sighted colleagues would allow themselves to be*



*used as human guide based on the benefit they will get.* It could be noted that some of the sighted counterpart will allow themselves as human guide considering what they will get out of it because they do not see it as free assistance.

#### **4.7 Strategies to Address Challenges Associated with Student with Visual Impairment in using Orientation and Mobility Techniques in accessing their Learning Environment**

From the above discussion, it shows clearly that there were serious challenges that hindered the competence of students with visual impairment in accessing their learning environment at Wenchi Senior High School (SHS). However, these challenges would not be left unaddressed. A number of strategies outlined should be adopted by the school and the resource teachers and these were highlighted as follows; the mobility cane technique, independent travel technique and human guide.

##### **4.7.1 The mobility cane technique**

There were a number of strategies highlighted by the students and the researcher to address the challenges hindering their competence in accessing their learning environment. In the first place, it was found that regular training every morning should be adopted by the resource teachers to address the challenge of students with visual impairment not having the confidence to use the mobility cane in the school environment. Some interviewees explained that, *“there should be thirty (30) minutes training every morning and this would help us to use the mobility cane to access our learning environment”*

Secondly, to address difficulty of students not able to identify objects within their learning environment as a result of the school environment not being accessible to them. In this regard, some students indicated that, *“The school environment should*



*have enough landmark and cues and the school roads should be levelled for easy movement*". This would help the students with visual impairment to be able to easily identify objects and obstacles to enable them to take good notice of the school environment.

Again, the strategies that could help to address the use of long canes in the school. There should be a mobility cane that meet the length of the user that would be easy to use at any place because the long cane disturbs the other colleagues in the classroom. some students indicated that, *we found it difficult to send the long cane to the classroom because it disturbs our colleagues, that is why we don't like using it*. It was noted that the students don't use the canes because of its nature so the canes in the school should be change.

Some students indicated that, the canes were old canes and some of the canes were taller than some of the students, a cane length should be at the shoulder level of the user. The strategy could be that the school should advertise the inclusiveness of the school and make people aware of the support that can been given to students with visual impairment in the school and the kind of assistance the school would need from donors and philanthropists and the P.T.A.

Lastly, the school should have orientation and mobility instructor in the school to team up with the resource teachers to enable them give the needed training on orientation and mobility to students with visual impairment.

#### **4.7.2 The independent travel technique**

The strategies used to address the challenge in independent travel technique, the resource teachers should always encourage students with visual impairment to master courage and move freely in the school environment in order to access the environment. Some student said that, *"we always get scared to drag my fit on the*

*floor or to use the back of our hands to trail on the wall*". It was noted that the students lack training *on shore lining and trailing technique*. The resource teachers should assist students to get deep understanding of both techniques.

Again, to address the challenges students with visual impairment face, their inability to combine both lower and upper body protection techniques which exposed them to danger. Some students indicated that, *they don't usually apply the techniques so they always forget some of the skills involved in the lower and upper body techniques*. It was noted that the resource teachers do not practice the techniques regularly with the students. Constant practice of the technique would enable the students get control of the technique to enable them explore the school environment,

Lastly, other interviewees also expressed that, *"the resource teachers should help them with the practice of some of the techniques"*. The resource teachers should encourage both the students with visual impairment and their parents on the need for the students with visual impairment to constantly practice the techniques involved in independent travel technique to boost the students confidence to enable them use the techniques effectively in the school environment.

#### **4.7.3 The human guide technique**

To address the challenges involved in the human guide technique. The students with visual impairment should be well equipped in the techniques involved in orientation and mobility to enable them to give the needed basic training to their sighted colleagues they always use as human guide for safety movement and understanding of the school environment. Some students said that, *"the sighted counterpart do not see the guiding assistance they offer to us as free; they would definitely ask for something in return"*. It could be noted that, the sighted counterpart do not see the need to offer the assistance for free, but when given the needed basic

training and education by the students with visual impairment. They would see the need to assist individuals with visual impairment and avail themselves anytime the need arises.



## CHAPTER FIVE

### DISCUSSIONS

#### 5.0 Introduction

This section discusses the results in the light of the literature review and theoretical framework.

#### 5.1 Research Question 1: How competent are students with visual impairment in the use of the mobility cane techniques in accessing their learning environment at the school?

There was the need to develop the skills in mobility cane technique of students with visual impairment because it had great impact on their lives. The students could acquire the skills to exercise control over their environment, it would lead to greater independence, increased self-sufficiency and enhanced self-esteem (Hong, Choi, & Hong, 2020). In this current study, mobility cane techniques were measured in three areas and these included student's grip and position of the mobility cane, student's ability to swing the mobility cane in movement by observing the touch point technique and student's ability in using the mobility cane to detect objects and obstacles within their learning environment. Based on the performance rating on the mobility cane technique as shown in tables 4, 5 and 6, it was obvious that grip and positioning of the mobility cane, the ability to swing the mobility cane in movement by observing the touch point technique and ability to use the mobility cane to detect objects and obstacles was a challenge among the students in Wenchi Senior High School. This was because on grip and position of the mobility cane 63% of the students were able to perform the skill and, on the ability, to swing the mobility cane in movement by observing the touch point technique, 51% of the students were able

to perform the skill. In addition, the study found out that cumulatively 36% out of 63% and 31% out of 51% of the students scored excellent to very good respectively, on grip and position of the mobility cane and the ability to swing the mobility cane in movement by observing the touch point technique. This means that, most of the students were responsive to practising the use of the mobility cane technique.

Whereas the remaining numbers of students within the unconscious incompetence stage, were 37% and 49% respectively, this shows that these students were not aware of the skills in relation to grip and position of the mobility cane and ability to swing the mobility cane in movement by observing the touch point technique. These smaller number of students were unable to perform the skill, it would be necessary to give special attention to these smaller number of students to help them progress through the stages of competence as described in the conscious competence matrix. The varied performance also typifies the need not to presume that all students have learned basic orientation and mobility skills like grip and position of the mobility cane before movement and ability to swing the mobility cane in movement by observing the touch point technique. The finding on the identification of objects and obstacles within their learning environment indicated that majority of the students perform poorly. This was because 51% of the students were unable to perform the skill and were within the unconscious incompetence stage in identifying objects and obstacles within their learning environment using the mobility cane. The conscious competence matrix explains that individuals in this stage would have a particular deficiency in the area concerned. It was found that 18% out of the 51% of the students failed to accurately identify obstacles within their environment using the mobility cane. This was a matter of great concern because most of the students acknowledged that they were introduced to orientation and mobility since class two

and so it was expected that they should have moved out of the unconscious incompetence stage. It was clear that the amount of time spent in practicing how to use the mobility cane techniques in accessing their learning environment and develop student's competence in orientation and mobility was less, that was why a number of students were still unconscious of the need for this skill, 49% of the students were able to perform the skill as shown in Table 6.

Evaluating the student competence in line with the conscious competence matrix adopted for this study, it was obvious that majority of the students had reached the conscious competence stage in relation to grip and positioning of the mobility cane and student's ability to swing the mobility cane in movement by observing the touch point technique. The students had achieved 'conscious competence' in two skills because they performed it reliably well but needed to concentrate in order to perfect the skills, because their competence level could be seen as not yet "mature" or "automatic". That means, the students could be able to demonstrate the skill to others, but unlikely to be able to teach it well to another person.

On the issue of identification of objects and obstacles within their learning environment using the mobility cane, the student's competence level could be judged as conscious incompetence. That means, students understand the need to improve their skills and ability to work hard on the techniques to make them effective. Therefore, with commitment to learning and constant practice to address the challenges affecting students on the mobility cane technique, this effort would help the majority of the students to move to the 'unconscious competence' stage.

It could be concluded that the students at Wenchi Senior High School were not given serious attention with the practice of mobility cane technique which could help them to develop their competence in identifying objects and obstacles within their

learning environment. It could be necessary to consider the effectiveness of training being offered to the students in the school. Again, there should be consistency in practice of orientation and mobility in the school. However, this study is limited in its focus on examining the availability of orientation and mobility instructors in the school and how this could translate in students' competence in the use of mobility cane in their school environment.

## **5.2 Research Question 2: How competent are students with visual impairment in employing the independent travel techniques in accessing their learning environment at the school?**

From Table 7, there were lower response rate of students because 40% of the students were able to square off at their starting point in independent travel technique and this shows that smaller number of students were able to apply the technique in this area. Students' ability to indicate their starting point links their competence on squaring off. The squaring off technique provides additional benefit for students on their starting points which allow students to navigate around their school environment safely. It was found that 15% out of the 40% of the students scored very good in squaring off at their starting point in independent travel technique as shown in table 7. As a result, the remaining 60% being majority of the students had become incompetent in applying the squaring off technique at their starting point in independent travel technique.

Again, 54% of the students were able to use the trailing technique and were located within the conscious competence stage, continuous training and commitment on the part of students to learn more about orientation and mobility techniques would be required to help the remaining 46% students to master the trailing techniques. In terms of the student's ability to use upper and lower body protection in identifying

objects and obstacles within their learning environment, 46% of the students were able to perform the skills the students had progressed from stage one to stages three and four of the conscious competence matrix, while the remaining 54% students were unable to perform the skill. Generally, the incompetence of this 54% of the students was seen as a great challenge. The use of upper and lower body protection technique in identifying objects and obstacles within their learning environment could be seen as one of the basic steps for beginners in orientation and mobility. And if at SHS, about 54% of the students still lack the basic skills in employing upper and lower body protection techniques, then it could be reasonable to question the effectiveness of orientation and mobility training in the school and when would such students with visual impairment make progress in learning higher skills in orientation and mobility and stop relying too much on the human guide.

The reasons for the failure of some of the students, unable to use the upper and lower body protection techniques, clearly show that students had not master upper and lower body protection technique. That notwithstanding, there would be the need for the mobility trainers to review mobility training techniques for students with visual impairment in the school. This would help to refresh the minds of those in stage two to progress to the third and fourth stages. It would also provide skills to those within stage one, who by participating in this study had become aware of their deficiency would also develop desire to learn the new skills of using upper and lower body protection techniques.

From table 10, it was found that cumulatively 37% of the students were competent in employing the independent travel technique to perform specific activity. These students exhibit their competence and their ability to employ the independent travel technique. The remaining majority of 63% of the students were in stage one of



the conscious competence matrix, when given serious attention and further guidance by the resource teachers and the students wellness to commit themselves in learning the skill, they could progress to the second, third and fourth stage. This higher number of students normally rely on human guide for assistance, but if students could recognize the need to demonstrate independency and willing to practice orientation and mobility in the school environment, they could easily progress to the fourth stage of the conscious competence matrix.

### **5.3 Research Question 3: How competent are students with visual impairment in employing the human guide techniques in accessing their learning environment at the school?**

Students with visual impairment ability to use the human guide to access their learning environment. From Table 11,12 and 13, the result shows that 63% been the majority of the students were competent in the use of the human guide technique. But the remaining 37% of the students were located within the unconscious incompetence stage which means that students were not aware of the skills but with continuous training and commitment on the part of students to learn more about the human guide technique would be required. The ability of the students with visual impairment to create good rapport between him and the human guide and able to grasp the human guide hand just a little above the elbow. These skills need to be mastered by both the individual with visual impairment and the human guide. Again, the skills student with visual impairment apply to achieve safety when using the human guide, 87% of the students with visual impairment were able to perform the skills. 51% out of the 87% of students scored very good and excellent respectively. This student had progressed from stage one to stages two, three and four of the conscious competence matrix, while the remaining 13% students were unable to perform the skills. Generally, the

incompetence of this 13% students were seen as a challenge. Again, students with visual impairment ability to ascend and descend the stairs in the normal way following a step behind the human guide and able to use the human guide to negotiate narrow space, these skills could be seen as one of the basic skills for beginners in orientation and mobility. If at SHS, about 13% of the students still had challenges with the skills, then there should be effort by the school to promote orientation and mobility training in the school.

Lastly, the skills students with visual impairment apply to sit on a chair while using the human guide technique. The data shows that, 71% of the students were able to perform the skills, but the remaining 29% of the students were placed on the unconscious incompetent stage. The student with visual impairment ability to move his free hand to follow the back of the chair down to the seat, if the chair is empty and ability to turn around so that his legs touch the front of the chair and then sit down. if some students were unable to use the human guide technique, then it raised serious concerned. The reasons for the failure of the smaller number of students unable to apply the skills, show clearly that students had not master orientation and mobility technique. There should be the need for the school authorities and resource teachers to show commitment in mobility training for students with visual impairment to help the students' progress through the various stages in orientation and mobility and make students aware of their deficiency in the techniques involve in orientation and mobility.

**5.4 Research Question 4: What are the challenges associated with the use of the various techniques by students with visual impairment in accessing their learning environment at the school?**

There could be numerous benefits of the various techniques used among students with visual impairment. The use of the various techniques involved in orientation and mobility by students with visual impairment to gain independence and autonomy concerning travel and accessing their learning environment just like their sighted peers (Conroy, 2016). In spite of this, a number of barriers exist to the successful and effective use of the mobility cane, independent travel technique and human guide technique among students with visual impairment in their school environment. The evidence from the data indicated that majority of the students with visual impairment at Wenchi Senior High School had various challenges which hamper their competencies in accessing the school environment.

However, the results of the study show that, the challenges mentioned under the mobility cane technique, were the unavailability of the mobility cane, old canes and long canes which students with visual impairment found it difficult using such canes and as a result of that students had no interest using the canes to access the learning environments. The school environment not disability friendly, the school roads could be seen as rough which need to be levelled to enable students with visual impairment to access the school environment. Again, the school should provide students with visual impairment canes that the height of the cane should be at their shoulder level to motivate and give confidence to the student because the long canes disturbed their colleagues in the classroom but the canes in their sides would be easy for the students with visual impairment to manage. Lastly, the nature of the school

environment makes the use of the mobility cane in accessing the learning environment a challenge for student with visual impairment.

Secondly, under the independent travel technique the result show that, most of the students with visual impairment had challenges employing the independent travel technique in accessing the school environment. The challenges include, difficulty in applying shore lining and trailing technique, difficulty applying lower and upper body protection technique and difficulty employing any of the techniques involved in independent travel for specific activity. The classroom floors were not tiled and as a result of that, students found it difficult to drag their feet on the floor as demanded in the shore lining skills, the students were afraid to get hurt. Some of the classroom floor had open small holes. Again, the students with visual impairment were afraid to use the back of their hand to trail on the halls of the dormitory, classroom and resource room. Students lack the confidence to apply the trailing technique.

Again, the students had challenge applying the lower body protection technique or upper body protection technique. Students would usually forget to combine both lower and upper body protection technique as the same time to protect the whole body. It could be noted that, student's inability to practice the techniques constantly makes it difficult for students to do the right thing.

Furthermore, the human guide technique, the result shows that some students had difficulty with human guide technique. The areas the students had difficulties were, the school environment not disability friendly, the sighted colleague unwilling to offer themselves to be used as human guide, lack of confidence on the side of students with visual impairment when moving with the human guide and some human guide take advantage of students with visual impairment. The school environment was rough and a lot of pot holes, during the raining season one could notice stagnant water

on the school roads which lead to various places in the school. The students with visual impairment always step in the stagnant waters and some of the students with visual impairment sometimes fall inside using the human guide. Again, the school environment and the roads in the school should be levelled to enable rain water to flow that could do away with the stagnate water and the smooth road would enable students with visual impairment to move freely and move confidently on the school environment.

Lastly, the students with visual impairment need training on orientation and mobility which would enable them educate the human guide on some basic techniques to enable the human guide alert students with visual impairment about dangers on the school environment. The basic techniques would help the human guide to understand the need to offer free assistance to students with visual impairment. These challenges were linked to limited financial resources, high costs of equipment and eligibility issues for possessing devices (Afreeen, 2014). Nyavor and Amaniampong (2020), stated that, lack of knowledge and awareness among people with visual impairment, reluctance to use the devices, poor device performance, changes in needs or priorities, and feelings of stigmatization were major reasons for under used assistive technology devices.

The study results also seem to suggest that there were some strategies to be adopted by the resource teachers at Wenchi Senior High School to address these challenges. The strategies were sustainable to develop students' competence in using orientation and mobility techniques in the school environment. The students' competence in using the mobility cane technique, independent travel technique and human guide technique were affected by lack of orientation and mobility training, lack of better mobility canes, school environment not disability friendly and students

always rely on the human guide. And, student's inability to constantly practice orientation and mobility techniques to gain confidence on the school environment.



## CHAPTER SIX

### CONCLUSIONS AND RECOMMENDATIONS

#### 6.0 Introduction

This chapter drawn conclusion on the study and also presents the recommendations made based on the conclusion.

#### 6.1 Summary of Findings

The findings show that, grip and position of the mobility cane and the ability to swing the mobility cane in movement was a challenge among some of the students. Although, majority of the students were able to perform the skills on grip and position of the mobility cane and swinging of the mobility cane in movement by observing the touch point technique, on identification of object and obstacles within their learning environment, the finding showed that majority of the students were still within the unconscious incompetence stage. This means that, students were deficient in identifying objects and obstacles using mobility cane. The amount of time spent to develop the competence of students in identifying objects and obstacles were limited which made students unconscious of the need for the skill. Students with visual impairment performed poorly on that aspect.

Secondly, on the independent travel techniques minority of the students were competent employing squaring off technique at their starting point and this shows that, the smaller number of students had control using the squaring off technique in the school environment. The finding shows that, majority of the student had not reached the conscious competence stage of using squaring off in independent travel technique. Again, majority of the students expressed their inability to use upper and lower body protection technique in identifying object and obstacles which limits them

from becoming unconsciously competent. The competence of students with visual impairment in applying the skills involve in trailing technique was encouraging because majority of the students were able to perform the skills. But in terms of being able to locate and open a door using independent travel technique, majority of the students had not progressed to stages two and three on the conscious competence matrix. The number of students with high competence in being able to employ independent travel technique to access the road at lead to the dormitory was extremely low.

Lastly, on the human guide technique, majority of the students perform well on the ability to apply the skills involve in human guide technique and ability to use the human guide to achieve safety. The smaller number of students who performed poorly, called for serious orientation and mobility training. Again, majority of the students were able to perform the skills involve in using the human guide to sit on a chair, but the smaller number of students who were unable to perform the skills call for constant training on the skill, to enable students with visual impairment to pass on some of the acquired basic skills to the human guide for safe movement.

The use of orientation and mobility techniques among students with visual impairment at Wenchi Senior High School were not without challenges. The students expressed difficulties in developing their competence on mobility cane technique, independent travel techniques and human guide technique. In terms of mobility cane techniques, the challenges included; inadequate practice of orientation and mobility training, the school environment not being disability friendly, the canes were not collapsible, old canes, there were not enough canes in the school and students lose interest using the mobility cane. The concerns on independent travel technique included; difficult employing shore lining technique, trailing technique in the school



and difficult use upper and lower body protection technique and lack of confidence to access the school environment on the side of the students with visual impairment. Some of the challenges on the human guide technique included; students with visual impairment lacked confidence on the human guide, some human guide took advantage of the assistance they offer students with visual impairment and the school environment not being disability friendly which could put student with visual impairment in danger when using the human guide.

The findings suggest that, there were some strategies that could be adopted by the resource teacher at Wenchi Senior High School to address these challenges. The strategies seem to be sustainable to develop students' competence on mobility cane techniques, the independent travel techniques and the human guide techniques.

## **6.2 Conclusion**

The conclusion of the findings on competence of students with visual impairment in using orientation and mobility techniques in accessing their learning environment has great impact on their lives. The techniques involve in orientation and mobility includes; mobility cane techniques, independent travel techniques and human guide techniques. The findings indicate that the students were competent in using the human guide techniques, they were however not competent in other areas such as mobility cane techniques and independent travel techniques. Students with visual impairment had difficulties in the following areas; students with visual impairment get training on orientation and mobility once, during their first academic year. This attitude of the school would not help the students to develop interest for orientation and mobility and students would not get the courage and confidence to apply any of the mobility techniques in the school environment. As a result of that students would

always rely on their sighted counterpart for assistance which would not help students to be independent in accessing the school environment.

The school should therefore focus attention on the following areas; students with visual impairment would need constant training on orientation and mobility to enable the student's master the various techniques involved in orientation and mobility. Also, the resource teachers should team up with the orientation and mobility instructor to enable them offer effective training to students with visual impairment.

Again, the school environment should be disability friendly and accessible to all learners in the school. There should be enough modern mobility canes and the resource teachers should encourage students to use orientation and mobility techniques. Lastly, orientation and mobility should be on the school timetable for effective training and practice of orientation and mobility.

### **6.3 Recommendations**

The following recommendations were made based on the study findings.

1. The researcher recommended that more practice time should be created by the school to enable students to use mobility cane in accessing the school environment and develop competence in this area.
2. The researcher further recommended that strategies adopted to develop students' constant practice of independent travel technique should be encouraged by the school.
3. The researcher recommended that vigorous training on human guide technique should be encouraged by the school.
4. The school must buy mobility canes or seek for support from the school Parent Teacher Association (P.T.A), donors and philanthropists to motivate students with visual impairment.

5. The government should make sure the school environment and the school buildings have universal designs in order to make the environment disability friendly for social participation of students with visual impairment.

#### **6.4 Suggestions for Further Research**

1. Evaluate the effectiveness of the resource teachers in training students with visual impairment in orientation and mobility.
2. Evaluate the availability of the orientation and mobility instructors in inclusive schools in Ghana.



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## APPENDICES

### APPENDIX A

#### Introductory Letter



UNIVERSITY OF EDUCATION, WINNEBA

FACULTY OF EDUCATIONAL STUDIES

DEPARTMENT OF SPECIAL EDUCATION

✉ P. O. Box 25, Winneba, Ghana

✉ [sped@uew.edu.gh](mailto:sped@uew.edu.gh)

☎ +233 (020) 2041069

April 25, 2019

Wenchi Methodist SHS  
Post Office Box 88  
Bono - Region

Dear Sir/Madam,

#### LETTER OF INTRODUCTION


I write to introduce to you Mr. Isaac Marfo Osei an M.Phil student of the Department of Special Education of the University of Education, Winneba, with registration number 8170150023.

He is currently working on his thesis on the topic: *"The use of Mobility cane in acquiring Mobility skills by students with Visual Impairment at Wenchi SHS in the Brong East Region of Ghana"*.

I should be grateful if you could give him the needed assistance to enable him carry out his studies.

Thank you.

Yours faithfully,

  
DEPARTMENT OF SPECIAL EDUCATION  
UNIVERSITY OF EDUCATION  
P. O. BOX 25  
WINNEBA  
**DR. DANIEL S. Q. DOGBE**  
Ag. Head of Department

## APPENDIX B

### Observational Checklist

#### UNIVERSITY OF EDUCATION, WINNEBA

An observation guide adopted to purposely provide data on the topic, “**competencies of students with visual impairment in using orientation and mobility techniques in Wenchi Senior High School in the Bono Region of Ghana**”. This thesis is submitted to the Department of Special Education. In partial fulfilment of the requirement for the award of MPhil Degree in Special Education, Winneba. Therefore, any information that is provided would be treated confidentially and wholly for the academic pursuit.

**Name of observee:** .....

*(Compulsory)*

**Date:** .....

**Signature**.....

**INSTRUCTION:** Please tick (✓) where applicable.

#### Demographic Characteristics of Student

1. Gender      Male [ ]      Female [ ]
2. Age          Below 14 [ ]      14 – 18 years [ ]      18years and above [ ]

**Objective 1: To assess students with visual impairments’ competence in the use of the mobility cane in accessing their learning environment at Wenchi Senior High School.**

#### 3. Student grip and position the mobility cane?

**Prompt,**

The student holds the mobility cane with the thumb in front of the top of the handle.

- a. Excellent [ ] b. Very Good [ ] c. Good [ ] d. Average [ ] e. Poor [ ] f. Very Poor [ ]

The student holds the mobility cane with the forefinger fully extended on the cane

- a. Excellent [ ] b. Very Good [ ] c. Good [ ] d. Average [ ] e. Poor [ ] f. Very Poor [ ]

The student holds the mobility cane with the second finger curled behind the cane to support it.

- a. Excellent [ ] b. Very Good [ ] c. Good [ ] d. Average [ ] e. Poor [ ] f. Very Poor [ ]

The student holding the mobility cane with the last two fingers relaxed.

- a. Excellent [ ] b. Very Good [ ] c. Good [ ] d. Average [ ] e. Poor [ ] f. Very Poor [ ]

The student holds the mobility cane with the hand pointed towards the middle of the body in front of the navel.

- a. Excellent [ ] b. Very Good [ ] c. Good [ ] d. Average [ ] e. Poor [ ] f. Very Poor [ ]

#### **4. Students ability to swing the mobility cane in movement by observing the touch points techniques.**

##### **Prompt,**

The student swings the cane in movement by applying the Arc skill whereby the cane tip touch the ground a little wider than the width of the student body.

- a. Excellent [ ] b. Very Good [ ] c. Good [ ] d. Average [ ] e. Poor [ ] f. Very Poor [ ]

The student swings the cane in movement by applying the instep skills whereby student simultaneously extend one foot forward then the cane move in the reverse.

- Excellent [ ] b. Very Good [ ] c. Good [ ] d. Average [ ] e. Poor [ ] f. Very Poor [ ]

the student swings the cane in movement by applying the rhyme skills whereby the student lift the cane tip just to clear the ground as the student traverses between two points of contact.

- Excellent [ ] b. Very Good [ ] c. Good [ ] d. Average [ ] e. Poor [ ] f. Very Poor [ ]

The student swinging the cane in movement by applying the one point skill whereby the student hold the cane like the diagonal technique, and the student use the cane to touch the ground now and then.

- Excellent [ ] b. Very Good [ ] c. Good [ ] d. Average  e. Poor  f. Very Poor

The student swinging the cane in movement by applying the two point skill whereby the student swing the cane from one side to another in front of the body for the cane to protect the body,

- Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student swinging the cane in movement by applying the three point skills whereby the student swing the cane from one side to another in front of the body that is the two point skill as well as another extra touch to any of the side

- Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor



**5. Students ability to detect objects and obstacles within their learning environment using the mobility cane.**

**Prompt,**

The Students is able to Identify Obstacles with Cane without bumping into it.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

Student using the cane to detect object and exploring around the object to know the side of the object.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

Student using the echo of the tip of the cane to detect and identify a particular object.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student slides or scrapes the underground with the cane to get more detailed information about the kind of underground or dry spots and puddles

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student is able to shoreline by swinging the cane to touch the wall and swinging it back to the other side

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

**Objective 2: To determine how students with visual impairment employ the use of the independent traveling technique in accessing their learning environment at Wenchi Senior High School.**

**7. Students starting point by squaring off in independent travel technique.**

**Prompt,**

The student both shoulder and other body parts are in alignment to the edge of the road or shore line.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student walks in straight direction.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student ability to locate object which is directly in front or in line with another object.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

**8. Student ability to apply the skills involved in trailing technique.**

**Prompt,**

Student extend the arm that is closer to the object and the student use the back of his/her of fingers to touch the object.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student uses the back of the hand to follow the wall, edge of a table, and other similar object.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student walk by trailing fingers along the surface of the object towards his destination.

Excellent  b. Very Good  c. Good  d. Average  d. Poor  d. Very Poor

**9. Students ability to use upper and lower body protection technique in identifying objects and obstacles within their learning environment?**

**Prompt,**

The student raises the left or the right arm to the shoulder height. (Upper-body protection).

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student bend the elbow to form an angle of 120 degree and his or her fore-arm is held across in the front of the face. (Upper-body protection).

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor



The student turned the hand so that the palm faces away from the body and his/her fingers are slightly bent back towards the body. (Upper-body protection).

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student extends either the left or right arm and move the same position to the middle of the body. (Lower-body protection).

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student bends the fingers slightly with the palm facing their body. (Lower-body protection).

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student arm is held about 10-20 centimeter in front of the body as student moves in this position in the direction desired. (Lower-body protection)

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

10. Students employ trailing technique to identify their sitting places in classrooms.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

**11. Students ability to employ independent traveling technique for specific activities in the school environment.**

**Prompt;**

Student uses independent travel technique to identify their sitting place in the classroom

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

Student use independent travel technique to open a door leading to the resource room.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

Students use independent travel technique to locate their teachers desk.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

**Objective 3. To examine the use of human guide in by students with visual impairment in accessing their learning environment.**

**12. Students with visual impairment ability to use the human guide?**

**Prompt;**

Student with visual impairment ability to create rapport between him and the guide.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

Students' ability to grasp the human guide just a little above the elbow.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

Student with visual impairment ability to have a half step interval between him and the guide when movement is about to take place.

Excellent  b. Very Good  c. Good  d. Average  d. Poor  d. Very Poor

Student with visual impairment ability to change his hands by slowing down the speed of movement between him and the guide.

Excellent  b. Very Good  c. Good  d. Average  d. Poor  d. Very Poor

**13. The skills students with visual impairment apply to achieve safety whiles using the human guide.**

**Prompt;**

The student with visual impairment is able to use the human guide to negotiate narrow space?

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

The student with visual impairment can ascend and descend the stairs in the normal way following a step behind the human guide?

Excellent  b. Very Good  c. Good  d. Average  d. Poor  d. Very Poor

The student with visual impairment can approach and use doors whiles using the human guide technique.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor

**14. The skills students with visual impairment apply to sit on a chair while using the guide technique.**

**Prompt;**

The student with visual impairment can move his free hand to follow the back of the chair down to the seat, if the chair is empty.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor .

The student with visual impairment Move unaided around to the front while holding the back of the chair.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor .

The student with visual impairment turns around so that his legs are touching the front of the chair and then sit down.

Excellent  b. Very Good  c. Good  d. Average  e. Poor  f. Very Poor .



## APPENDIX C

### Interview Guide

#### UNIVERSITY OF EDUCATION, WINNEBA

This interview guide is purposely designed for **students** to provide data on the topic, “**competency of persons with visual impairment in accessing\ their learning environment in Wenchi Senior High School**”. This thesis is submitted to the Department of Special Education, Winneba therefore, any information that is provided would be treated confidentially and wholly for the academic pursuit.

#### **Objective 4: Challenges associated with the use of the various techniques in accessing their learning environment at Wenchi Senior High School?**

At what class were you introduced to the orientation and mobility in the school?

- a. How does the school environment support you, when using the mobility cane?
- b. How many times in a week do you practice orientation and mobility skills?
- c. Does the school have enough mobility canes?
- d. How do you assess the state of these canes?
- e. How many orientation and mobility specialist do you have in the school?
- f. what are the challenges you face in apply shore lining and trailing techniques?
- g. What challenges do you face applying lower and upper body protection techniques?
- h. Share with me the challenges you face in employing independent travel technique for movement?
- i. Do you have confidants in the human guide?
- j. How willing is the human guide in offering assistance to you?
- k. what are the challenges when using the human guide?
- l. What do you suggest could be done to address these challenges?

**Name of Interviewee:** .....

*(Compulsory)*

**Date:** .....

**Signature**.....

