

UNIVERSITY OF CAPE COAST

ACCESSIBILITY OF I.C.T. TOOLS TO STUDENTS WITH VISUAL
IMPAIRMENT IN GHANA
(A CASE STUDY IN BRONG AHAFO REGION)

FRANKLIN OSEI-ANTWI

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BY

FRANKLIN OSEI-ANTWI

Dissertation submitted to the College of Distance Education of University of
Cape Coast, in partial fulfillment of the requirements for the award of Master
of Education Degree in Information Technology.

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DECLARATION

Candidate's Declaration

I hereby declare that this dissertation is the results of my own original research and that no part of it has been presented for another degree in this University or elsewhere.

Candidate's Signature: Date.....

Candidate's Name:.....

Supervisors' Declaration

I hereby declare that the preparation and presentation of the dissertation were supervised in accordance with the guidelines for the supervision of dissertation laid down by the University of Cape Coast.

Supervisor's Signature: Date.....

Supervisor's Name:.....

ABSTRACT

The study looked at how accessible ICT tools are to students with visual impairment at the Wenchi Methodist Senior High School of Brong Ahafo Region of Ghana. A total number of 38 respondents took part in the survey. The 38 respondents were made up of 20 males, representing 52.6% of the students and 18 females, also representing 47.24% of the students. The Wenchi Methodist Senior High School was targeted because it is the only school that takes charge of the education of students with visual impairment in the Brong Ahafo Region of Ghana. Simple random sampling was used to select the respondents. The respondents were students with visual impairment in the Wenchi Methodist Senior High School. The instrument used for data collection in the study was a questionnaire. SPSS was used in generating the various output of the analysis of data that was collected. The main findings of the study were that, most teachers do not use the computer to give instructions in their lesson delivery to the students with visual impairment in the school. Also, inadequate ICT infrastructure in the school is another major factor inhibiting the integration of ICT into the teaching and learning process of students with visual impairment. The study also revealed that in spite of the fact that students with visual impairment have some computers at their disposal, most of them do not learn with those computers. It is therefore important that the government makes ICT facilities accessible to students with visual impairment. Training on how to use the computer for the purpose of learning should also be organized for students with visual impairment.

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I owe my son, Jason Osei-Antwi thankfulness for the time and fatherly love he missed while I was in school for this purpose. To my parents and siblings, I am paying a debt of appreciation for their empathetic understanding and support. I am also thankful to my uncle, Rev. C. Obeng Ankamah for his unfailing source of inspiration, encouragement, offered support and prayers. As well, my genuine gratitude goes to Mr. Emmanuel Arthur Nyarko and Dr. Paul Nyagorme, all of College of Distance Education, UCC for their guidance, encouragement and the free consultations they offered to me throughout my studies. I am also thankful to my research team for their assistance throughout the study.

However, I am solely responsible for any blemish and faintness in this work.

DEDICATION

This work is dedicated to my son, Jason Osei-Antwi and my family.

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CHAPTER ONE

INTRODUCTION

Background to the Study

Over the past few years, many nations in Africa have been trying to make significant achievements in socio-economic development through the integration of Information and Communication Technology (ICT) in their respective national development policies. Ghana is of no exception to this, and is committed to ensuring nationwide ICT and Internet accessibility to all of its citizens, regardless of their status or disabilities.

Ghana is gradually transforming into an information-based society, where premium and value is based on the ability to create, distribute and utilize information using technology. Obviously, the success in such a society would require education and computer literacy. It would therefore be nearly impossible to complete an education, let alone find and maintain employment without Information and Communication Technology (ICT) and computer skills.

Accordingly, Information and Communication Technology (ICT) accessibility is essential to everyone. The disabled, primarily the visually impaired (VI), cannot be left behind in the transition into such an information based society. In fact, I C T can have a more significant impact on Persons with Visual Impairment with respect to education, employment and other aspects of their daily life.

Smith & Luckassan (1995), defined blindness as a severe limitation with visual acuity or central vision (not being able to see a wide area) and the absence of functional use of sight. This means that a student with visual

impairment is merely one who cannot see well or at all. He or she must be afforded the same right to Information Technology enjoyed by a student with sight.

Owing to this, ICT accessibility must not discriminate based upon the physical capabilities of students. The United Nations [UN] (1981) noted that people with disabilities are often restricted in the extent to which they can take a full part in the society in which they live, but many of those restrictions can be reduced by their receiving of good education. According to Lanbon (2011), there are many socio-economic hurdles impeding the progress of students with visual impairment on their way to development. Lanbon (2011) further stated that there is a general social stigma attached to student with visual impairment, which is virtually inescapable. Generally, the average citizen does not have confidence in the abilities and capabilities of a person with visual impairment. This stereotype attitude affects the education and employment opportunities for the visually impaired.

According to Mandesi (2007), people with disabilities face numerous challenges; to access opportunities equal to those enjoyed by their peers in day-to-day life. Environmental, physical, legal and institutional barriers are found throughout society, and negative attitudes to persons with disabilities often cause social exclusion and are the hardest to overcome. Mandesi further asserts that, for people with disabilities to be treated equally, physical barriers to accessing resources need to be removed and attitudes changed.

According to Article 9 of the UN Convention on the Rights of Persons with Disabilities (CRPD) (2006), accessibility is to enable persons with disabilities to live independently and participate fully in all aspects of life.

State Parties are therefore to take the appropriate measures to ensure that persons with disabilities have access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas.

The United Nations Education Social and Cultural Organization/ Institute for Information Technologies in Education [UNESCO/IITE] (2006) suggests that the conditions in every type of inclusive educational area cannot be successfully created without the appropriate ICT tools applied. Assistive tools must be used to allow students with Special Educational Needs (SEN) primarily, the visually impaired to participate in the educational process based on special techniques and equipment.

Buckley (2000) and Avoke, Yekple, Dogbe & Mamah (2006) asserted that in today's modern society, technology has paved its way to even enhance and develop the quality of tools and techniques of educators and students' learning pattern. Computers can easily be taught to blind people using keyboard to grasp such letter and intelligent voice command using speaker and very good software specially designed for visually impaired students. Technology has brought about all the possibilities for a blind and a visually normal individual an equal opportunity to learn.

The principal proposition from the UN Convention on the Rights of Persons with Disabilities (CRPD) encapsulates the essential purpose of using ICT in education for people with disabilities (UN, 2006). "The use of ICT is not an end in itself; rather it is a means of supporting individual people's

learning opportunities” (UNESCO/IITE and the European Agency for Development in Special Needs Education [EADSNE], 2011, p. 138). In this sense, the term ‘equity’ can purposefully be used instead of the phrase ‘equal opportunity’. “Equity implies people’s individual needs being met in inclusive settings through differentiated approaches that take learner diversity into account” (UNESCO/IITE & EADSNE 2011, p. 138).

In order to guarantee equity in educational opportunities, the accessibility of ICT educational tools should be considered a major issue world-wide. Nowadays, students with visual impairment can take advantage of a large number of effective assistive technologies but, while using such electronic materials for learning purposes, they may encounter a number of different accessibility and usability problems. The variety of obstacles they may find on their way may be quite large mainly because the term "visually impaired" encompasses a wide range of deficits, ranging from blindness to a number of other multifaceted handicapping conditions that prevents the eye from seeing well.

Increasingly, these learning opportunities occur within inclusive education contexts. This means that learners with or without various disabilities and special needs should have their educational needs met within the same settings. According to European Agency for Development in Special Needs Education (2009), the goal for inclusive education is to promote full participation and opportunities for all learners vulnerable to exclusion, in order that they can realize their potentials.

The use of technology in education plays a vital role by enabling flexible curriculum development and assisting students with visual-

impairment to participate as equal as sighted students in learning experiences. It also helps to prepare them for life-long learning, recreation and work outside of school.

Ghana, in 1992 adopted the 'Global Education for All' policy as a constitutional provision (Article 38, Section 2). This aims at providing Free Compulsory Universal Basic Education to all Ghanaian children of school-going age. At a conference on developing education for the visually impaired in 1993, an emphasis was placed on the inclusion of children with visual impairment (VI) in schools in Ghana. This made Inclusive Education (IE) an interventional programme for school children (pupils) with Low Vision (LV) in the mainstream schools but were not given the needed support to assist them perform academically. Information and Communication Technology (ICT), since 1993 is commonly used in most schools in Ghana with concentrations on how Information and Communication Technology (ICT) can make teaching and learning active and lively.

ICT in Ghana is in use as a subject and as a methodology facilitated by schools and the home environment. Teachers and instructors appreciate ICT as instrument of development and a principal element of work, leisure, public network and global environment. It has a weighty potential to support students, teachers and instructors, administrators and other patrons to succeed with their efforts to improve upon the sinking standard of education in Ghana. With ICT, the world is just a village where whatever happens in a place can be read anywhere by the power of the internet. ICT has become a promoter to deeply transform what is occurring in the classroom since it accelerates moves towards student centered learning. This includes students with disability and

for that matter, students with visual impairment. The researcher believes that many students with visual impairment accept as truth that ICT can permit them have access to the curriculum by providing substitute methods of reading and recording work.

A person with visual impairment can establish and manage his or her own business and perform business communications through computer applications. They can also hold positions in government and in offices. Some of these persons include David Blunket, a British and Takahasi Sinobu, who is a Japanese. In government, currently, Ghana's Minister for Chieftaincy and Traditional Affairs is a person with visual impairment in the person of Dr. Henry Seidu Daanaa who is performing his role the same way as a sighted person would do.

According to UNESCO (2009), the UN Convention on the Rights of Persons with Disabilities continues to be implemented globally. States which are parties to the Convention continue to put up efforts to realize the goal of Inclusive Education to ensure that students with disabilities have full access, on equal basis with other students, to regular schools and teachings.

The UNESCO's Consultative Expert Meeting Report (2011) states that, an estimated 186 million children with disabilities worldwide have not completed their primary school education. This tells that children with disabilities makes up the world's largest and most disadvantaged minority in terms of education. Meanwhile, both governments and educational authorities face the challenge of meeting the Millennium Development Goals which have set a target of full enrolment and completion of primary school for all children by 2015.

It has been noted that “the use of ICTs in all stages of education, training and human resource development should be promoted, taking into account the special needs of persons with disabilities and disadvantaged and vulnerable groups” (The World Summit on the Information Society 2003, Declaration of Principles: 30). As education leaders implement reforms and changes to meet this challenge, the use of accessible ICT facilities must be seen as a key component in enabling students to learn according to their individual abilities and learning styles.

Statement of the Problem

Usually, persons with visual impairment have the need of more instructional resources to function well. According to Ministry of Education (1999), a very small percentage of children with special educational essentials have access to ICT educational provision and training through Special Schools.

According to Myjoyonline.com (2013, October 25th), visually impaired students across the country do not write ICT exams in the West African Senior High School Certificate Examination (WASSCE). It further reported that the few schools that have units that take charge of the visually impaired do not have the basic ICT infrastructure to offer tuition to these students.

The student with visual impairment needs ICT tools like auditory and talking devices, a software like Job Access with Speech (JAWS) and Wind Braille to enhance his or her learning. This can considerably bridge the knowledge gap between the student with sight and the student with visual impairment. Inopportunately, the student with visual impairment seems to have

been neglected and unloved. Researchers such as Offei (2012) conducted a study on “Analysis of English Language Performance of Students with Visual Impairment and Sighted Students at Akropong Presbyterian College of Education”. Lanbon (2011) also researched into the topic, “Assessing the Provision of ICT facilities to Visually Impaired Students in Ghana”. However, much attention has not been placed on the educational needs and desires of students with visual impairment. This puts them in a dire predicament which is characterized by nonexistence of education and widespread of unemployment of people with visual impairment in Ghana.

Various measures through policies, aimed at stamping out poverty among the citizenry have been taken by various governments in Ghana. Unfortunately, these measures have not addressed the problems facing the blind and the visually impaired people (BVIP). To date, BVIP have had limited access to formal education, inadequate qualified personnel to impart knowledge, skills and the right educational materials, ICT and assistive tools and above all, access to the labour market.

The result of the above is that, majority of blind and visually impaired children and adults are found at home while some are found on the streets begging for alms. The question that needs to be answered is; how can this undesirable development be reversed?

Purpose of the Study

The general goal of the study was to examine how accessible ICT facilities are to students with visual impairment. Specifically, the study focused on students with visual impairment’s understanding of ICT in

education. It also identified the challenges students with visual impairment face in their usage of ICT facilities. In addition, it identified ways in which ICT can optimize students with visual impairment's academic development.

Research Questions

The study sought to address the following questions.

1. What is the understanding of ICT to students with visual impairment in schools in Ghana?
2. How accessible is ICT facilities to students with visual impairment in schools in Ghana?
3. What are the challenges that students with visual impairment face when using ICT tools?
4. What is the impact of ICT tools on the academic performance of students with visual impairment in schools in Ghana?

Significance of the Study

The findings of this study will assist students with visual impairment to access the required ICT facilities to enhance their learning. The outcome will also assist policy makers and activists in governmental and non-governmental organizations and private institutions to formulate policies to optimize the academic development of students with visual impairment in Ghana. It will further attempt to disprove the belief that ICT is meant for students with sighted in schools. The researcher intends to communicate the findings of this study to stakeholders in education like the Ghana Education Service and the

general public through conferences, seminars, radio broadcast and publications on the internet.

Delimitation of the Study

Schools with students with visual impairment are widely dispersed in the country and for that matter the Wenchi Methodist Senior High School in the Brong Ahafo Region of Ghana was used for the study. Again, only students with visual impairment in the Wenchi Methodist Senior High School in the Brong Ahafo Region of Ghana were used for the study. It was projected that students with visual impairment face nearly the same challenges in the use of ICT facilities nationwide, the findings of this study can therefore be used to make generalization.

Limitations to the study

The questionnaire used necessitated the use of Likert's scale format for the collection of data. This limited the degree to which the respondents desired to express themselves. Also, braille text would have been appropriate to use in constructing the questionnaire for the respondents. However, owing to logistic constrains, items in the questionnaire were printed and respondents were assisted to answer them. This may have influenced the responses from the respondents and may have consequently affected the findings. Lastly, statements or items on a questionnaire are generally stated in a positive form and respondents might have answered them in a likewise manner. The effects of all of the above were minimized by employing research assistants to help with the administration of the questionnaire.

Operational Definition of Terms

ICT: Information and Communication Technology

ICT Facilities: Computers and their accessories.

Accessibility: It is the degree to which a product, device, service, or environment is available and is easy to approach, reach, enter, speak with, or use.

Equity: It is a stipulation that all people should be treated similarly, unhampered by artificial barriers or prejudices or preferences, except when particular distinctions can be explicitly justified.

Assistive Technologies: Any item, piece of equipment, software or product system that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities.

Visual impairment: The general term used to refer to all levels of vision loss from total blindness to uncorrectable vision loss.

Inclusive Education: Educational settings in which students with disabilities are included or educated with abled peers in a least restrictive environment.

Low vision: Limitation in distance vision but is able to see objects and materials that are a few meters away.

Job Access with Speech (JAWS): Computer software for accessing the internet by the visually impaired

Disability: A total or partial behavioural, mental, physical or sensorial loss of functioning due to disease, malformation, accident or genetic factors.

Blindness: A severe limitation with visual acuity or central vision (not being able to see a wide area) and the absence of functional use of sight.

Organization of the Study

This study consist of five (5) chapters. Chapter one deals with the background to the study, statement of the problem, purpose of the study, research questions, significance of the study, delimitation and limitation, operationalization or definition of terms.

Chapter two reviews available literature related to the study. Chapter three discusses the methodology. The chapter four of the study focuses on the presentation and analysis of data which were collected. Lastly, chapter five presents the findings, summary, conclusion, recommendation, and suggestions for further research.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Introduction

The literature reviewed in this study touches on accessibility of ICT facilities to students with visual impairment in schools in Ghana. Substantial research materials, including Internet resources and hard-copy documents were collected, reviewed, and analyzed. Government documents such as ICT policy papers, disability legislation, and national policies on disability significantly contributed to the research. ICT-related technical documents, catalogues and brochures from technology manufacturers and dealers were also relied on.

The following subheadings were hoped to be reviewed with the hope that they will endorse or refute the findings of this study.

1. Theoretical Framework (Khan's Octagonal Framework)
2. The Nature of Visual Impairment
3. Policy on ICT education in Ghana
4. Objectives of Using ICT
5. How ICT can be used to enhance the teaching and learning process.
6. The Need for ICT in the Education.
7. Facilities Available for the Education of Students with Visual Impairment.
8. The Relevance of ICT to the Student with Visual Impairment
9. Challenges facing the use of ICT in the Education of the Student with Visual Impairment.

10. Lack of Training.

Theoretical Framework

Khan's Octagonal Framework

A variety of factors needs to be addressed in order to create a meaningful learning environment. Many of these factors are interrelated and interdependent. A systemic understanding of these factors can enable designers to create meaningful distributed learning environments. An example of such a factor is the Octagonal Framework. The framework has eight dimensions: **institutional, pedagogical, technological, interface design, evaluation, management, resource support, and ethical** (see Figure 1). Each dimension in the framework represents a category of issues that need to be addressed. These issues help to organize thinking, and ensure that the resulting learning program/environment creates a meaningful learning experience.

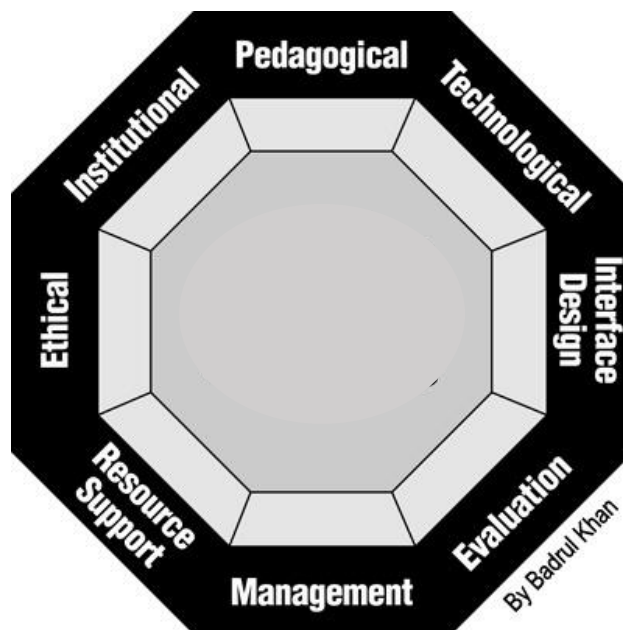


Figure 1: Khan's Octagonal Framework

The Nature of Visual Impairment

Ocloo, Hayford, Agbeke, Gadagbui, Avoke, Opong and Essel (2002) and Ocloo (2000) indicated that seeing is a dynamic process which is very individual. These writers are of the opinion that, among the five senses of humans, the eye feeds the brain with most information. This therefore makes vision very important in academia. Lowenfield (1980) tells that the sense of vision is one of the long distance senses which human beings have. This enables man to control his environment. Abosi and Ozoji (1985) and Avoke (2008) asserted that the eye is spherical in shape and in most activities the two eyes co-ordinate and function together as a perfect pair. Lowenfield (1974) cited in Ocloo et al (2002) is of the belief that only 10% of individuals considered as being visually impaired are in total darkness for which they are qualified to be considered blind. Scholl (1986) established that some visually impaired individuals have colour perception while others have light perception.

For the eye to perform its functions, light rays reflect from objects within the visual field through the cornea, aqueous, lens and vitreous to form a picture on the retina. From the retina through the optic nerves, the picture is sent to the visual cortex of the brain to be interpreted.

Avoke (2008) explained visual impairment as a concept that defines a blind person and someone with low vision. Avoke further asserts that, for educational purposes, visual impairment may be explained as referring to one whose vision is restricted to such an extent that it may require educational modification and adaptation. Heward and Orlansky (1980) submitted that the educational implication of visual impairment mainly considers the extent to

which an individual's visual impairment affects learning and makes special methods and materials necessary. Lowenfield (1980) pronounced a blind person as one who has a central visual acuity of 20/200 or less in the better eye with correcting glasses. The writer understands the assertion as one being able to see after correction at a distance of 20 feet what would be seen by a normal sight at 200 feet. Colebrander (1977) cited in Avoke (2008), suggests that a blind person is one who has only light perception.

Abosi and Ozoji (1985) wrote that a person is said to be blind if he cannot read and write print after all optical corrective measures have been taken and such a person uses braille as a medium for reading and writing. Harley (1963), cited in Avoke (2008) submitted that neither definitions based on visual acuity nor educational definitions should be used as the sole criterion for deciding on how and with what programme an individual should be educated. Instead, what should be considered should include visual loss (etiology), age of onset, intellectual ability, experiential background and chronological age.

Due to the nature of blindness and its complicating problems, some misconceptions about blind persons have been reinforced. Mandel and Fiscus (1981) listed common misconceptions about the blind to include the idea that: the blind cannot work and therefore cannot contribute meaningfully to society. Also all blind people see nothing and the blind is born with or acquire inherent senses that allow them to learn. To Avoke (2008), the blind must develop other senses themselves to appease the lost sense- vision.

According to World Health Organization (WHO, 2004), over forty (40) million people in the world are blind, and over one hundred and twenty (120) million people have low vision conditions which are uncorrectable and incurable. It also estimated that, in every five seconds a person goes blind and is expected to double by 2020. It added that more than ninety percent (90%) of people with visual impairment live in developing countries in Sub-Saharan Africa like Ghana. WHO (2004) has emphasized that “childhood blindness remains a significant problem, with an estimated 1.4 million blind children who are below age 15. The problem appears even more relevant if we consider students with visual impairments other than blindness (the incidence of low vision being generally estimated three times greater than blindness). In the same report, it was found that, in 2002, there were about 161 million (about 2.6% of the world population) visually impaired people in the world, of whom 124 million (about 2% of the world population) had low vision and 37 million (about 0.6% of the world population) were blind. Data of the WHO seem to confirm that sight impaired students are a relevant percentage of the overall population of the students with disabilities (Viisola, 1999).

Disability Studies conducted by the Ministry of Manpower Development and Employment (MMDE, 1999) as cited in Ministry of Education Report (1999a) tells that about six percent (6%) of the population in Ghana have some type of mild to severe visual disability. According to Ghana Society for the Blind (1990) as cited in WHO Report (2004), there are about twelve thousand (12,000) to thirty thousand (30,000) children with low vision in Ghana.

It seems that a very small percentage of children (nearly 2%) with special educational needs have access to educational support and training through "Special Schools". Children who get access to special schools are mainly residing in urban areas. According to the Ministry of Education data only 3,362 children are provided with special services signifying less than 2% of the population. Studies propose that about 10% of visually impaired children are being provided for through special institutions. Females are underrepresented in most of the special needs schools.

Casely-Hayford and Lynch (2003) expressed that the main fraction of funding for Special Education is used for the provision of food for special institutions. Most of the special schools are less-resourced and operate with inadequate basic learning materials (i.e. Hearing aids, Braille paper and styluses, tape recorders books in large print, magnifying reading glass etc.). The schools do not have special equipment for learners (hearing aids, learning materials etc). These revelations move to propose that the issue of visual impairment in Ghana is very disturbing and the earlier something is done about it the better.

Policy on ICT education in Ghana

The government of Ghana is committed to the transformation of the agro-based economy of Ghana into an information rich and knowledge – based economy and society using the tools of information and Communication Technology (ICT). The government of Ghana has acknowledged the need for ICT training and education in the schools, colleges and Universities and the improvement of the education system as a whole. The development of ICT

into Education will result in the creation of new possibilities for learners and teachers to engage in new ways of Information Acquisition and analysis; ICT will enhance access to Education and improve the quality of education delivery on equitable basis.

The government is therefore committed to a comprehensive programme of rapid development and utilization of ICT within the education sector to transform the educational system and thereby improve the lives of the people. It is the government's desire that through the development of ICT, in Education, the culture and practice of traditional memory-based learning will be transformed to education that stimulates thinking and creativity necessary to meet the challenges of the twenty first Century (C21). According to the Draft Copy of ICT Policy, (2006) as cited in Agyemang (2014), given the magnitude of the task ahead, the government enjoins both the public and private sector to join hands to ensure that our children receive high quality teaching and learning.

Objectives of Using ICT

There is a considerable amount of studies describing how ICT is being used effectively in schools. DFES (2003) as cited in Agyemang (2014) set out the objectives for effective use of ICT in teaching and learning as;

1. "Broadening horizons with more opportunities for creative expression."
2. Flexibility to study where, when and how best it suits individuals need and preferences.
3. Increased motivation through learning that stimulates interest

4. Wider access to learning and participation.
5. Sensible choices about when, when not and how to use new technology to enhance, enrich and sustain learning.

It further suggests that ICT can make significant contribution to teaching and learning across all subjects and ages. Thus, it can engage and motivate children and young people and meet their individual needs. Cox (1997) also suggested some benefits of using ICT in lessons;

1. Increased commitment to learning tasks
2. Enhanced enjoyment and interest in learning the subject
3. Increased in self –directed independent learning
4. Enhanced self-esteem leading to expectations of achieving goals.”

Becker (2001) documented a study of over 4000 teachers in the USA and suggested the following objectives of using ICT in lessons

1. “Getting information and ideas
2. Expressing self in writing
3. Mastering subject skills just taught
4. Learning computer skills and
5. Analyzing information

How ICT can be used to enhance the teaching and learning process

Most studies highlight the need to plan carefully and use ICT in lessons. Sutherland et. al (2004) summed this up as, “ICT alone does not enhance learning. How ICT is incorporated into learning activities is what is important”.

Abbott et al (2001) also stressed on the importance of detailed lesson planning when using ICT and that, students must be encouraged to understand the process involved rather than simply focusing on the output. Some teachers may use ICT as a way of encouraging independent learning skill needs to be planned and supervised with the teacher directing the student's activities and outputs ICT though is an effective tool in the hands of an effective teacher, and not a panacea in its own right. It would seem that prerequisite for success is the subject knowledge of the teacher and his ability to weave the use of ICT into the existing curriculum. BECTA (2001) suggested that success comes when teachers use applications that open up new ways of working. It acknowledges that this involves planning and imagination, and the result will be "spectacular"

The Need for ICT in the Education

The need for ICT facilities in the education of students with visual impairment does not relate to Ghana's educational system only but that of the developed world as well. According to Rodden et. al (2010), younger people are extra likely to be computer literate and by this, they will have an impact on students with visual impairment's studies by the virtue of them being more conversant with computers and internet use. Swarts (2006) cite in Agyeman (2014) asserts that ICTs can be powerful, essential tools for learning: understanding, interpreting and communicating about the real world.

Millear, Tiberghien, and Le Marechal, cited in Hawkins (2002) tells that while many educational ministries around the world are committed to computerize schools, few have developed clear strategies to integrate its use fully as pedagogical tools in the classrooms.

In the arena of education, the basic concept of “Non – discrimination” requires the ability of all people to have “equal opportunity in education, regardless of their social class, ethnicity, background or physical disabilities” (Klironomos et al., 2005). Students with visual impairment have, then, the right to expect the same standard of education as their schoolmates and, in this view, they also have the right to access and use mainstream educational tools, including e-learning based ones. Such tools are worldwide considered powerful tools to foster learning (Hitchcock et al., 2003). At the same time, it is well known that, due to the widespread use of technological tools, “disadvantaged or excluded groups” including the visually impaired, may face the danger of further marginalization. With the advent of the digital computer and its broad penetration, disabled and elderly people face serious problems in accessing computing devices” (Stephanidis and Savidis, 2001)

Anderson (2006) underlines that, in the field of education, while technologies are beneficial and have been shown to help with educational tasks, their design and usability are issues of concern. Students with disabilities may, in fact, face relevant difficulties both in “accessing and in “using” ICT tools and, depending on the type of impairment and the types of obstacles encountered may vary considerably. It seems that the issue of the accessibility and usability of ICT tools by visually impaired students is

tackled, taking into account the fact that in almost all the developed countries they represent a significant part of the school population.

According to Lanbon (2011), in the United State of America, Federal and State estimates used for planning educational services do not adequately account for the number of children in the United States who are blind or with visual impairment. He further stated that in 1995, 24,877 children with visual impairment were reported by the U.S Department of Education. However, he also stated that a recent study by the researchers tells that the figure failed to account for 80% of those children.

Unfortunately, because many professionals lack the specialized skills necessary to recognize and address vision loss, there are also children with visual and multiple impairments whose vision loss remains undiagnosed throughout their school experience (Erin, Daugherty, Dignan, & Pearson, 1990).

The poor count of visually impaired children tells that some nations lacks critical information about the need for specialized services for these children, and cannot correctly allocate the specialized resources and personnel required. Consequently, many children do not receive the appropriate specialized educational services they need.

Notwithstanding these challenges, education policy makers are fairly keen about the introduction of ICT in all stages of education of which Ghanaian schools are not left out. The Government of Ghana puts a strong importance on the role of ICT and its contributions towards the educational development of the country.

According to the National Disability Policy Document, (2000), as cited in WHO report 2004, if the Government is to achieve some progress in meeting its Vision 2020 on the Persons with Disabilities, it must look at the needs of its own people. Additionally, Sight Savers International Report cited in UNESCO (2002) added that the setting up of computer laboratories on a national level may fit a secondary school model where teaching methods and practices are broader based. However, this model does not necessarily suit schools where children follow Specialized Education Programme; where Inclusive Education Programme is required for the visually impaired schools. The literature on Ghana's ICT policy as cited in Mfudo (2003) reveals that there is currently no coordination on the proposed national ICT policy. The report added that the Ministry of Education has not established a clear framework for the implementation of ICT into the schools with student with visual impairment.

The Daily Graphic of Monday July 2, 2007 reported that The Director of Special Education Service of Ghana Education Service, Mrs. Sussan Kennedy, has called for the introduction of ICT Programmes in the Special Schools. She stressed the need for the provision of adequate facilities to help meet the growing demand of children with disabilities. She also called for the provision of materials for the brailing at the Brail Press and special integrated schools to use appropriate devices and qualified personnel to ensure the teaching and learning of brailed mathematics and science. This will help to eliminate the negative attitudes towards the disabled, among other things.

Shockingly according to myjoyonline.com (2013, October. 25th), visually impaired students across the country do not write ICT exams in the West African Senior High School Certificate Examination (WASSCE). It further reported that the few schools that have units that take charge of the visually impaired do not have the basic ICT infrastructure to offer tuition to these students. According to a publication by myarkfmonline.com (11th February, 2014), The Head of the Information and Communication Technology (ICT) of the Wenchi Methodist Senior High School who also acted as the head of Integrate Visually Impaired School in the Wenchi Municipality of the Brong Ahafo Region, Mr. Charles Appiah Korang has called on the Ghana Education Service (GES) and other stakeholders in the educational sector to consider allowing Visually Impaired Students to use Computers in their examination halls during their final exams.

Facilities Available for the Education of Students with Visual Impairment

Funston and Morrison (2000) in a study of Young People's Access to IT in Australia was that there was less access to Internet and ICT among people with visual impairment. It was established from the Australian investigation that 12-24 year old's access to ICT by which few government initiatives targeted the disadvantaged young people focused on regional capitals. They indicate that projects aimed at interventions are uneven in distribution, uncoordinated with some states having more comprehensive policies than others where the basic level of training available was expensive. Finally, there are some community-based organizations working in areas of

technology services for young people, but they lack the long term support necessary for sustainability.

U. S. Department of Education's Eighteenth Annual Report to Congress on the Implementation of the Individuals with Disabilities Act, (1990) as cited in Erin et. al, (1990) stated that; Microcomputers, operated with appropriate special software and computer adaptive devices make it possible for visually impaired children to have equal access to electronic data like their sighted peers. Besides learning the computer as a subject in special schools, visually impaired children can use the computer to assist them in learning other academic subjects and as an aid to communication with sighted children.

According to Parthemore (2003), computer literacy education in Ghana until recent times was limited to some few private schools in major urban areas due to lack of facilities. He added that in schools with visually impaired students, little is known about the use of computers. Educational policy makers, non-governmental organizations (NGO), bilateral and multilateral donor organizations and school administrations are making the collective efforts to promote ICT in Ghanaian secondary schools. Because of the efforts of NGOs and donor organization in particular, ICT facilities have extended to some of these special schools, mostly in urban communities (Dankwa, 1997; Parthemore, 2003).

One of the shocking revelations was that according to the Ghana Broadcasting Cooperation News of Monday February 2, 2009 (as cited in Lanbon, 2011), the School for the visually impaired in Akropong Akuapem had only thirty two (32) computers for over three hundred (300) visually

impaired in 2009. This was disclosed by the Headmaster of Akropong School for the visually impaired when Accra based NGO donated learning materials to the school as part of their social responsibilities.

Until recently, the visually impaired student at Okuapeman Senior High School could not use ICT facilities for their learning. This was because they had none. According to Ghana News Agency, (2nd February, 2009), a 25,000-dollar information and Communication Technology (ICT) centre with computers for the visually impaired was inaugurated at Okuapeman School at Akropon-Akuapem only in 2008.

“With effect from 2008/9 academic year, the physically challenged, visually impaired, low vision students and able students of University of Cape Coast (UCC) would be able to access different sources of information from computers in the Library”.

This was disclosed by Martey, the Acting Librarian of University of Cape Coast. This has been made possible due to an ICT facility being installed in the University Library with the view of providing information accessibility and facilitate information gathering for all categories of students, both at UCC and elsewhere. He noted further that the project is made up of four sub-projects namely, the Physically-Challenged /Visually-Impaired and Low Vision Project, the Digital Library Project, the Data Project and the Library Automation Project. Touching on the basis for the project, the Acting Librarian said that the Library had over the years provided services to able on-campus students with less attention on the disadvantaged. He concluded that

the Library had identified the need to provide ICT accessibility to the disadvantaged of which the able ones would also benefit.

The Relevance of ICT to the Student with Visual Impairment

ICT is a tool to support and boost a wide range of teaching approaches that teachers can mobilize to address learners' individual difference. Many students have physical disabilities and depend on adaptive technologies such as discover keys and discover switches, trackballs, and enlarged keyboards and modified switches for learning.

Schools which have access to the Internet where students can use web sites as resources for research and learning, ICT can in such ways be used to promote the basic principles of local pedagogy. Funston and Morrison (2000) opined that universal access to the internet and computers is increasingly being seen by the public to be a precondition for more inclusive use of ICT that has individual and collective social and economic benefits in a knowledge based society.

Abakah, (2002) stated that the impact of computers in this information age will be even greater in the future than it has been before. He therefore cautions that the computer should be thought of as a tool whose effectiveness is determined by the user. With computer knowledge, one will be able to participate in decisions on how to use computerized information systems. There is an enormous potential for future computer applications in a number of fields including ICT. Carin and Sund (1989) have proposed that students including the visually impaired, must develop their computer literacy so that they can fit and flourish in our society in this 21st century.

The Challenges Facing the use of ICT Facilities for Educating the Visually Impaired

According to the Charter of Fundamental Human Rights of the Europeans Union (2000), any discrimination based on any ground such as sex, race, colour, ethnic or social origin, genetic features, language, religion or belief, political or any other opinion, membership of a national minority, property, birth, disability, age or sexual orientation shall be prohibited.

In the field of education, the basic concept of “Non-discrimination” entail the ability of all people to have “equal opportunity in education, regardless of their social class, ethnicity, background or physical disabilities” Klironomos et al, cited by Anderson, (2006).

Data of the World Health Organization seems to confirm that visually impaired students are of relevant percentage of the overall population of the students with disabilities. (Viisola, Burzagli et al., as cited in Mfudo, 2003). Such students who could extremely profit from using ICT for educational purposes face a number of accessibility problems despite the availability of a growing number of technology-enhanced and sophisticated assistive devices.

At present, visually impaired in Africa are not only the victims of their physical circumstances, but also the objects of both deliberate and inadvertent discriminations. In the majority of the cases, blind people enjoy little access if at all in education, employment, information and other forms of social participation. For instance the Braille version of their textbooks does not normally reach them until after the school years have ended. They are therefore subject to a continuous process of marginalization, which in turn

contributes to their state of deepening poverty, further exclusion and vulnerability to complex health hazards and other difficulties.

Students with visual disabilities have the right to expect the same standard of education as their schoolmates. They also have the right to access and use mainstream educational tools including ICT based ones which are generally referred to as “e-learning tools”. Such tools are worldwide considered powerful tools to foster learning. Furthermore, it is well known that due to the widespread use of technological tools, the visually impaired face the danger of further marginalization with the advent of the digital computer and its broad penetration, disabled and elderly people face serious problems in accessing computing devices. Hartviksen, & Akselsen, (2002).

According to Tsengu, Brodtkorb, and Almnes (1996), cited by Lars (2000), “Relevant educational materials aimed at enhancing academic achievement and skill acquisition like typewriters, current brailled textbooks, large print text book, computers, talking calculators, tape recorders and Braille machines, are either in short supply or completely absent”. Unhappily enough, the above mentioned facilities are the very ones which are actually required to enhance effect learning in the schools with visually.

Anderson (2006) underlines that in the field of education “while ICT technologies are beneficial and have been shown to help with educational tasks, their design and usability are the issues”. Tom (2000) as cited in Lanbon (2011) asserts that, software and hardware for the visually impaired are often very expensive and sometimes not accessible.

Students with disabilities may face relevant difficulties both in “accessing and in “using” e-learning tools depending on the type of impairments. The task of listing all such problems is not easy mainly because students with visual disabilities are a highly inhomogeneous category showing a wide range of different specific abilities, disabilities and needs. The Blind and low vision students for instance, despite the fact that they are both often simply referred to as “visually impaired”, present very different visual problems, find different obstacles and ask for different kinds of help and support.

What is more, even the category of low vision students is a highly heterogeneous one: it encompasses a wide variety of different visual characteristics. In this perspective, the different instructional tools (those ICT based as well as the traditional ones) may or may not meet the needs of each single user, depending on her /his specific impairment.

According to Tamru (2005), one of the problems facing the education of the visually impaired is the lack of basic means of communication and electronic infrastructure which remains a greatest obstacle for many African Governments. To implement their plans other challenges include the provision of adequate resources for low to medium technology applications such as teaching-learning aids. One does not need to look at only the limited access to computer and information technology facilities to recognize the gap.

Commenting further on accessibility, Musili (2000) as cited by Lanbon (2011) opined that; “The major roadblock to accessing digital content in the developing world, where more than ninety percent of the world’s visually

impaired live, are affordability and accessibility. He further added that: in the developed world, there are numerous technologies to help the blind and visually impaired “read” books, periodicals, and Web based content via computers and mobile devices. Advances in Text to Speech, Braille interfaces, and navigable audio books allow millions to access information in ways not previously possible. But software and hardware for the visually impaired are often very expensive and sometimes not accessible.

There is a clear evidence that Information and Communication Technology facilities are either inadequate or unavailable to students with visual impairment in the country. In a recent Ghanaian case study (Ismail, 2002), opined that the high cost for providing electricity (where there is none) and connectivity to telephone and internet services are major setbacks to providing ICT in most schools in Ghana.

The study continued that the distribution of educational resources especially, material inputs, teaching personnel, and well-equipped facilities, have always been skewed in favour of the sighted. While the foregoing facts call for swift control and prevention measures, they also forcefully draw the attention of people to look for a solution for the plight of those who have needlessly been affected already.

Commenting on the statement above, the Chairman of Educational Committee of Ghana Association for the Blind (GAB), Mr. Stephen Nketia lamented that “Education appeared to be one of the areas where the blind and partially sighted suffer most from exclusion”. He also complained of very limited educational facilities for the visually impaired in the country and

appeal to the government for help. He further added that even with Akropong and Wa schools for the visually impaired which have some facilities for the educating the blind, most of them are old and out of use.

Another challenge of the visually impaired in Ghana is the greater number of visually impaired are not able to use ICT facilities because they have never been exposed to such facilities. Many visually impaired in Ghana do not know how to use the Tactile Guide and other software which could assist them contribute their quota to society independently. This was disclosed by Mr. Nicholas Halm, National Secretary of GAB that several polling stations did not have Tactile Guide during the 7th December 2008 polls. As a result, “independent voting was defeated” in the case of the visually impaired. He therefore called for tactile ballot guides to be made available for future elections.

It is not only computers but also other technology like mobile phones with different sophisticated software that may be used visually impaired people independently. It has been proven that a visually impaired person can complete his or her tasks independently if given the proper equipment. The solution is clear and it has already been recognized by many NGOs and policy makers but providing ICT education and equipment more widely, visually impaired people will be equipped to move ahead in competition with others.

Lack of Training

A full and complete integration of ICT use in education requires high quality frequent training and professional development. If this training is not provided, then attempts at integration will inevitably be unsuccessful. This is

significant, as according to most studies another barrier that is frequently cited, is the lack of effective training. A study by Pelgrum in 2001 revealed that there were not enough training opportunities for teachers in the use of ICT in the classroom.

The training of teachers in the integration of ICT in the learning and teaching process is a difficult one. This is so because it involves a number of complex factors in order to render the training effective. These complex factors include finding the time for training, training in pedagogy, skills training and the use of ICT in the teacher's initial training (Bingimlas 2009). BECTA (2004) concurred, asserting that training is particularly complex, because it is important to consider several components to ensure the effectiveness of the training. A similar study conducted by Cox et al (1999) argued that ICT training for teachers needs to incorporate pedagogical aspects.

This study concluded that when teachers received basic ICT training without considering the pedagogical aspects of ICT, they still did not know how to use ICT in class. Schoepp (2005) maintained that if new technology is going to be integrated into education, teachers should receive training on how to use the specific ICT, while Trotter (1999) concluded that training in ICT integration must be preceded by and supplemented with basic skills training. Studies by Gomes (2005) also concluded that lack of training in digital literacy, lack of pedagogic and didactic training in how to use ICT in the classroom and lack of training concerning the use of technologies in specific subject areas, were obstacles to the use of new technologies in classroom practice.

Cox et al (1999) again assert that if teachers are to be convinced of the value in using ICT in their teaching, their training should focus on pedagogical issues. This in the view of this study is due to the fact that even after teachers had attended professional development courses in ICT, they still did not know how to effectively use ICT in their classrooms. This was because too much emphasis was placed on acquiring technical ICT skills during training, as opposed to skills in how to incorporate ICT into the curriculum.

CHAPTER THREE

METHODOLOGY

Overview

The study looked into how accessible ICT tools are to students with visual impairment in Ghana. This chapter of this study is concerned with the various aspects of the research methodology employed by the researcher. It includes a meticulous description of the research design, population, sample and sampling technique, research instrument, data collection procedure and data analysis procedure.

Research Design

Descriptive survey was employed in this study. Descriptive survey is employed when the researcher wants to observe, describe and document the traits of conditions as they occur naturally. According to Best & Khan (1998), the objective of descriptive research is to observe, describe and document aspects of the situation as it naturally occurs. With descriptive research, the conditions already exist or have occurred and the researcher picks the vital variables for the breakdown of their relationships.

Descriptive research is also the type of research which stipulates the nature of a given phenomenon. It determines and reports the way things are. Descriptive research, thus, involves collecting data in order to test hypotheses or answer research questions concerning the current status of the subject of the study (Gay, 1992). Best and Kahn (1998) also maintain that, descriptive research is concerned with the conditions or relationships that exist such as determining the nature of current conditions, practices and attitudes; opinions

that are held; processes that are ongoing and trends that are developed. Amedahe (2002) is of the view that in descriptive research, accurate description of activities, objects, processes and persons are the main objectives of a research. Amedahe noted again that research is not a fact finding per se. In fact, there is sizably more to the descriptive research than just asking questions and reporting answers. It deals with interpreting the correlation among variables and describing their relationships. Descriptive research seeks to find answers to questions through the analysis of relationships between or among variables.

Gay (cited in Abakah, 2002), indicated that in a descriptive survey, data are collected from members of the population in order to determine present status of the population with respect to one or more variables. Descriptive survey method is also useful for examining a variety of educational problems including assessment of attitudes, views, demographic evidence (data), situation and procedures. Descriptive Data are frequently gathered through questionnaires, observations and interviews. With regards to this study, questionnaires were used to gather data. Questionnaire was selected for the study because it has the following merits; it produces quick results, it can be completed at the respondent's convenience and is also less expensive to use. A questionnaire may also have the following limitations, partial responses are quite possible and also it does not offer the opportunity of motivating the respondent to participate in the survey or answer questions.

Descriptive survey was well-thought-out suitable for this study because the researcher wanted to undertake the study so as to describe and define the

existing situation on how accessible ICT tools are to students with visual impairment in Brong Ahafo, for the purpose of their learning.

Population

Powers, Meenaghan and Toomey cited by DeVos (1998, p.190) delimits a population “as a set of entities for which all the measurements of interest to the practitioner are represented”. Population can therefore be understood to be all the individuals or items of interest under consideration.

For the purpose of this study, the population was forty (40) students with visual impairment in the Brong Ahafo Region of Ghana, specifically from the Wenchi Methodist Senior High School. The Wenchi Methodist Senior High School was selected because it was the only option since it is the only school that takes charge of the education of students with visual impairment in the region. There were forty (40) students with visual impairment in the school. This represents the total number (100%) of students with visual impairment who had been enrolled as students in the school as at the time the study was conducted. These students were in S.H.S Two (2) and S.H.S Three (3). Students in S.H.S One (1) were not involved in the study because they had not been registered in the school as students at time the study was conducted.

Table 1

The population of students with visual impairment in Wenchi Methodist S.H.S

Educational level	Frequency	Percentage
S.H.S One (1)	0	0
S.H.S Two (2)	22	60
S.H.S Three (3)	18	40
Total	40	100

Source: Field Survey, 2014.

Sample size

This study was conducted in the Brong Ahafo Region of Ghana. The Wenchi Senior High School of the Wenchi District was selected for this study. This was so, because the Wenchi Senior High School is the only school that takes charge of students with visual impairments in the region. Krejcie and Morgan table for determining sample size from a given population was used to determine the sample size. According Krejcie and Morgan (1970), when the population is forty (40), a sample size of thirty-six (36) is deemed representative. Two (2) was added to the number. This was to make up for unforeseen contingences. Therefore, the sample size of the population was thirty-eight (38). The Krejcie and Morgan table for determining sample size from a given population was employed because the researcher wanted to come within 5 percentage points (with 95 percent certainty) of what the results would have been if the entire population had been surveyed.

Table 2

Table for Determining Sample Size from a Given Population

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note: N is population Size. S is the Sample Size

Source: Krejcie & Morgan, 1970

Sampling and Sampling Procedure

Sampling is a procedure of choosing a part of a population on which a study can be conducted. Leady (1993) as cited in Agyeman (2014) simply terms sampling as the process of selecting from a much larger population, a

group about which a generalized statement is made, so that selected parts represents the total group. Sampling, per say, is not a technique for obtaining data or information but it ensures that any technique used will be supported in obtaining information from a smaller group, which could truthfully represent the entire group.

According to Becker, (1989) and Selltiz (1976), a complete coverage of a population may not offer substantial advantage over a sample survey. On the contrary, it is argued that sampling provides a better option since it addresses the survey population in a short period of time and produces comparable and equally valid results. Probability sampling was employed in this study. The sampling technique adopted for this study was simple random sampling.

A simple random sample was used at this stage because with simple random sampling, the members of the population have the same chance of being selected. Simple random sampling is an unbiased random selection and a representative sample important in drawing conclusions from the results of a study. The goal of research is to be able to make conclusions pertaining to the population from the results obtained from a sample. Due to the representativeness of a sample obtained by simple random sampling, it is reasonable to make generalizations from the results of the sample back to the population. The students with visual impairment in the Wenchi Methodist Senior High School were sampled using simple random sampling under which the lottery method was put to use. Choosing the respondents by lottery method, a sampling frame was constructed. The sampling frame included the names of the students in an alphabetical order and they were numbered

accordingly. The names listed were substituted for numbered pieces of papers. Each numbered piece of paper corresponded to a name from the frame. All the numbered pieces of papers were placed on a table. They were mixed well and a resource person in the school was asked to pick them one by one. The numbers picked were registered against the names in the sample frame. This process continued until the required number of respondents was reached.

Sources of Data

The main source of data used in this study was the primary data. Primary data are data that have been collected from first-hand-experience. It is normally collected through the use of both open – ended and close – ended questions.

Instrument

According to Gay (1992), all research studies involve data collection. Since all studies are designed to either test hypotheses or answer research questions, they all require data with which to do so.

In order to obtain data, questionnaire was developed by the researcher and administered to the respondents. A questionnaire consists of a list of questions or statements relating to the aims of a study, its hypotheses and research questions to be tested or answered, to which the respondent is required to answer by writing.

According to Amedahe, (2002); Best and Khan, (1998), questions and response categories must be easy to identify and distinguish from other questions and response categories. For this reason, each item on the

questionnaire was coded to identify the rating of each response choice. A questionnaire was developed for the students with visual impairment in the Wenchi Methodist Senior High School of the Brong Ahafo Region of Ghana.

The questionnaire was developed based on a five point modified Likert's scale namely, (1) Strongly Agree, (2) Agree, (3) Disagree, (4) Strongly Disagree and (5) I Do Not Know to define the availability of ICT facilities in the school to students with visual impairment. Some of the items on the questionnaires were direct questions which required 'Yes' and 'No' answers.

The questionnaires were administered by the researcher and his team with help from some teachers and resource persons in the school. All the items were read to the respondents and their responses were ticked. To ensure external validity, the respondents responded to the items on the spot and the questionnaires were collected at the same time. To ensure internal validity, the respondents were stimulated to give their independent and impartial responses to the items. The data was analyzed with the help of a computer software called Statistical Package for Social Sciences (SPSS).

Validity and Reliability of Instrument

A content expert in the field of assessment was contacted to review and give advice on the questionnaire because content and face validity can be determined by expert judgment. Thereafter, the validity of the instrument was vetted and approved by the supervisor of the researcher for its content and face value. In addition to this, the instrument was pilot-tested at the Ghana National

S.H.S in Cape Coast. Polit and Hungler (1995) look at pilot study as a small-scale version or trial run which is done in preparation for the major study.

The relevance of pilot study is to help screen for unclear items in the instrument; to improve the data collection and scoring techniques; to serve as a guide for the general development of the entire research; to determine the appropriate time needed by the respondents to complete the questionnaires; to identify some of the respondents that could be expected and to establish the reliability and validity of the instrument. The pilot study was done in order to regularize the instrument so as to prevent some of the errors or problems that could have occurred in course of the main study.

A reliability test was then conducted on the questionnaire with the help of Cronbach's Alph. The test showed that the questionnaire had a reliability co-efficient of .812. This means the questionnaire was capable of eliciting the right responses form for the study. According Noreen, Richard and Edward (2006), Coefficient alph (also known as "Cronbach's alph") is perhaps the most widely used reliability coefficient. It estimates test-score reliability from a single test administration using information from the relationship among test items. Noreen, Richard and Edward further posited that coefficients at or above .80 are considered sufficiently reliable.

Data Collection Procedure

There were preliminary contacts with the school to officially seek for permission. A letter of consent was sent to the school to obtain permission to use the school as a focal point of the research study. A date was then set for first time interaction with the students for briefing. By this time, the

teachers/resource persons and students had been informed of the purpose, significance and the nature of the study.

The questionnaires were administered by the researcher. Some teachers and resource persons in the school were handpicked to assist in the administration of the questionnaires. Items on the questionnaire were read out to the students with visual impairment. Their responses were then ticked. The questionnaire was collected at the spot. This was to ensure that none of the questionnaire got lost.

Procedure for Data Analysis

The data of the study was organized in accordance with the research questions. Responses were coded. The data was processed and analyzed using a computer software called Statistical Package for Social Sciences (SPSS). Descriptive statistics consisting of frequency count and simple percentage scores were used to report the information on all factors and variables including respondent's personal information. Regarding the interpretation for variables used on Likert scale; measurement was used on the basis of the survey; 1 = strongly agree; 2 = agree; 3 = disagree; 4 = strongly disagree; 5 = I do not know (indifferent). With regards to research items that demanded Yes or No responses, measurement was as well used on the basis of the survey; 1 = yes; 2 = no.

Every research item on the questionnaire was coded for easy identification. The response options on the questionnaire were coded as well to ease the process of systematic data analysis. Each questionnaire dealt with

item by item according to the coding sequence. Under each research item, the responses from the students were analyzed duly.

Ethical Issues

The study took into consideration, a number of ethical issues. Among others the researcher ensured that:

1. Respondents remain anonymous; the identity of the respondents were kept secret. Respondents' identity was not made known to the public.
2. The information provided was treated confidential and used for the purpose of this study only; and
3. Participation was completely voluntary; the respondents participated at their own free will.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

Chapter Four presents the results of the study on accessibility of ICT tools to students with visual impairment in Brong Ahafo region of Ghana. It presents the socio-demographic characteristics of the respondents and discusses respondents' understanding of ICT to students with visual impairment. The Chapter links the main findings of the study with issues discussed in the literature.

Socio-Demographic Characteristics of Students

The socio demographic characteristics of the respondents includes gender, age, and educational backgrounds. Analysis of this data was deemed applicable as age (maturity level) and level of education could have a bearing on responses provided by those who responded to the questionnaire.

Table 3 gives an insight into the gender distribution of students with visual impairment. Table 4 gives details on the age distribution of the respondents. Table 5 also shows the educational levels of the respondents.

Table 3

Gender Distribution of Student Respondents

Gender	Frequency	Percentage
Male	20	52.6%
Female	18	47.4%
Total	38	100

Source: Field Survey, 2014.

With respect to the gender of the respondents, 52.6 % were males whilst 47.4% were females. This means that majority of the students with visual impairment in the school are male.

Age Distribution of Respondents in the Sample

Table 4

Age Distribution of Students with Visual Impairment

Age Group	Frequency	Percentage
14 and below	2	5.3
15 – 20	26	68.4
21 – 25	8	21.2
26 and above	2	5.3
Total	38	100

Source: Field Survey, 2014.

The study also identified the age groups of the students. It was explicit that majority of the respondents (68.4%) were aged between 15 and 20. This was closely followed by those who were between the age group of 21-25. The least age groups were found to be those in 14 and below and 26-30 (5.3% apiece). The modal age group was found to be 15-20.

Educational Levels of Respondents

Table 5

Class of Students

Educational level	Frequency	Percentage
S.H.S One (1)	0	0
S.H.S Two (2)	24	63.2
S.H.S Three (3)	14	36.8
Total	38	100

Source: Field Survey, 2014.

From table 5, respondents' educational levels were also looked at. The study revealed that students in SHS 2 were the majority (63.2%). Students in SHS 3 were the next with about 37%. The figure reported for those in SHS 1 was due to the fact that they had not been admitted at the time of the data collection. The results as shown in Table 5 indicates that majority of the respondents that were surveyed had spent at least a year in the school and were experienced enough to answer the items on the questionnaire. It could be put forward that the number of years spent in the school by the students could result in greater exposure to the use of computers and information technology.

Understanding of ICT to Students with Visual Impairment

The study sought to assess how students with visual impairment perceive ICT and its worth in their academic work. A detailed analysis is shown in table 6.

Table 6

Understanding of ICT to Students with Visual Impairment

Item	SA	A	D	SD	I Do Not Know	Total
	N	N	N	N	N	N
	(%)	(%)	(%)	(%)	(%)	(%)
ICT is a core subjects for students with visual Impairment.	6 (15.8)	17 (44.7)	8 (21.1)	7 (18.4)	0 (0)	38 (100)
ICT can help students with visual impairment to enhance their academic performance.	29 (76.3)	9 (23.7)	0 (0)	0 (0)	0 (0)	38 (100)
Students with visual impairment should know how to use the computer.	28 (73.7)	10 (26.3)	0 (0)	0 (0)	0 (0)	38 (100)
Students with visual impairment need ICT facilities to learn.	27 (71.1)	9 (23.7)	1 (2.6)	1 (2.6)	0 (0)	38 (100)
Students with visual impairment should attend computer classes with their sighted colleagues.	10 (26.3)	4 (10.5)	10 (26.3)	13 (34.2)	1 (2.6)	38 (100)
Students with visual impairment in schools require voice recorders and other assistive technologies to learn.	26 (68.4)	6 (15.8)	2 (5.3)	2 (5.3)	2 (5.3)	38 (100)

Table 6 continued

Students with visual impairment in schools are often sidelined by their sighted friends in the use of computers and in ICT lessons.	10 (26.3)	4 (10.5)	10 (26.3)	13 (34.2)	1 (2.6)	38 (100)
Classrooms, computer laboratories and dormitories should be built with due consideration of students with visual impairment.	29 (76.3)	8 (21.1)	1 (2.6)	0 (0)	0 (0)	38 (100)
Students with visual impairment in schools need to know how use the internet.	32 (84.2)	6 (15.8)	0 (0)	0 (0)	0 (0)	38 (100)
Schools with students with visual impairment should be connected to the internet.	29 (76.3)	7 (18.4)	2 (5.3)	0 (0)	0 (0)	38 (100)
Students with visual impairment should be allowed to use the computer in the examination hall.	23 (60.5)	8 (21.1)	3 (7.9)	3 (7.9)	1 (2.6)	38 (100)
Students with visual impairment require special software like JAWS to enable them to use the computer easily.	30 (78.9)	7 (18.4)	0 (0)	1 (2.6)	0 (0)	38 (100)
Making ICT facilities accessible to students with visual impairment motivate them to learn better.	27 (71.1)	8 (21.1)	3 (7.9)	0 (0)	0 (0)	38 (100)
Students with visual impairment are aware of the contributions of ICT to their education.	23 (60.5)	8 (21.1)	3 (7.9)	3 (7.9)	1 (2.6)	38 (100)

Source: Field Survey, 2014

It is evident from Table 6 that students with visual impairment have different levels of understanding of ICT. Of the 38 students, 6 representing 15.8% strongly agreed that ICT is a core subject taught to and studied by students with visual impairment, whilst 17(44.7%) agreed that ICT is a core subject for students with visual impairment. On the contrary, 8(21.1%) of the respondents disagreed to the statement while 7(18.4%) strongly disagreed that ICT is a core subject for students with visual impairment. The divided opinions depict two groups with regards to the statement. However, the responses of the majority 23(60.5%) is an indication that a high level of understanding of ICT exist with regards to students with visual impairment. This is in agreement with Lanbon (2011)'s assertion that ICT in Ghana is a subject of study and a methodology facilitated by schools and the home environment. This in effect means that ICT as a subject must be taught to all students including students with visual impairment at all levels of education in Brong Ahafo.

With regards to the issue of ICT and its enhancement on academic performance, 29 of the students representing 76.3% indicated strongly that ICT can help students with visual impairment to enhance their academic performance. Again, 9 students representing 23.7% of the respondents agree that ICT can help students with visual impairment to enhance their academic performance. None of the students disagreed to the statement that ICT can help students with visual impairment enhance their academic performance. This result agrees with Swarts (2006)'s assertion cited in Agyeman (2014) that ICTs can be powerful, essential tools for learning; understanding, interpreting and communicating about the real world. It is also in line with the assertion of

Merbler, Azar, and Ulman, (1999) that assistive technology devices have positive impact on students' learning, specifically, increasing reading speeds and comprehension rates. This demonstrates how useful ICT tools are to the academic performance of students with visual impairment. In the same vein, Table 6 shows that 28(73.7%) of the student who responded to the questionnaire are of the view that students with visual impairment should know how to use the computer while none of the respondents disagreed with the statement.

It is also indicated in Table 6 that a total number of 38(100%) students agree that students with visual impairment need ICT facilities to learn. This supports Carin and Sund's (1989) view that students including the visually impaired, must develop their computer literacy so that they can fit and flourish in the 21st century. This means ICT should be an integral part of the curriculum and syllabus of students with visual impairment

It can be seen from Table 6 that 23(60.5%) of the students disagree that students with visual impairment should attend computer classes with their sighted peers while 14(36.8%) students are of the view that students with visual impairment should attend computer classes with their sighted peers.

About 84.2% of the students agreed that students with visual impairment require voice recorders and other assistive technologies to learn. Again, 4(10.6%) disagree that the visually impaired students require assistive technologies to learn with 2(5.3%) indicating that they know nothing about the statement. A large number of respondents are of the view that students with visual impairment need assistive tools to learn with. This confirms the

assertion of Heward and Orlansky (1980) that the educational implication of visual impairment mainly considers the extent to which an individual's visual impairment affects learning and makes special methods and materials necessary. This implies that students with visual impairment can take advantage of ICT tools for learning purposes but the effectiveness of the ICT tools and assistive tools will depend on the consideration of the degree of individual students' visual impairment and the required ICT tool being given to be used.

Out of the 38 students who were surveyed, 14(36.8%) agreed that students with visual impairment are sidelined by their sighted colleagues as regards the use of computers and in ICT lessons. About 61 per cent of the students disagreed to this statement. This is probably due to the removal of barriers and change in attitude from negative to positive which has been shown to the students with visual impairment. This therefore confirms the assertion of Mandesi (2007) that, for people with disabilities to be treated equally, physical barriers to accessing resources need to be removed and attitudes changed.

With respect to the issue on how classrooms, computer laboratories and dormitories should be built, 37(97.4%) students are of the view that classrooms, computer laboratories and dormitories should be built with due consideration of students with visual impairment in schools. Only 1(2.6%) student disagreed with the statement.

With regards to students with visual impairment and the use of the internet, all the respondents, were of the view that students with visual impairment should know how to use the internet. This relates to Funston and

Morrison's (2000) claim that universal access to the internet and computers is increasingly being seen by the public to be a precondition for more inclusive use of ICT that has individual and collective social and economic benefits in a knowledge based society. Similarly, 36(94.7%) students agreed that schools with students with visual impairment should be connected to the internet while 2(5.3%) students disagreed to the statement.

Table 6 shows again that, 31(81.6%) of the respondents agreed that students with visual impairment should be allowed to use the computer in the examination hall. A moderate number (15.8%) disagreed to the statement with 1(2.6%) of the respondents indicating that he or she does not know. The response here is in line with a call made on Ghana Education Service (GES) and other stakeholders in the educational sector by the head of the Information and Communication Technology (ICT) of the Wenchi Methodist Senior High School to consider allowing students with visual impairment to use computers in their examination halls during their final exams. (myarkfonline.com, 11th February, 2014)

An overwhelming majority (97.3%) of the students shared in the opinion that students with visual impairment require special software to enable them use the computer easily while only 1(2.6%) disagreed to the statement. This finding is in tune with the U. S. Department of Education's Eighteenth Annual Report to Congress on the Implementation of the Individuals with Disabilities Act, (1996) as cited in Erin et. al (1990) which states that, microcomputers, operated with appropriate special software and computer adaptive devices make it possible for visually impaired children to have equal access to electronic data like their sighted peers. It is also in tune with the

assertion of Anderson (2006) that in the field of education while ICT technologies are beneficial and have been shown to help with educational tasks, their design and usability are the issues. The result here therefore means that if computers are provided with the required special software and hardware, computer will then become user friendly and interactive to students with visual impairment.

Table 6 also shows that 35(92.2%) students agreed to the statement that ensuring accessibility of ICT facilities to student with visual impairment will motivate them to learn better, with only 3(7.9%) disagreeing to the statement. Out of the total number, 31(81.6%) students agreed that they are aware of the contributions of ICT to their education. 6(10.8%) disagreed to the statement while 1(2.6%) indicated the he or she has no idea about the statement.

Accessibility of ICT tools to students with visual impairment

Table 7 presents an insight into the accessibility of ICT tools to students with visual impairment with regards to their academic work. The analysis is shown in Table 7.

Table 7

Accessibility of ICT tools to students with visual impairment

Item	Response							
	Yes		No		I Do Not Know		Total	
	N	%	N	%	N	%	N	%
My school has enough computers and its accessories needed by students with visual impairment.	10	26.3	23	60.5	5	13.2	38	100
I learn with the help of computers and assistive tools in class.	5	13.2	31	70.5	2	4.5	38	100
I study ICT as a subject.	30	78.9	7	18.4	1	2.6	38	100
My school has computers with special keyboard to enable me type the letters on the keyboard.	13	34.2	24	63.2	1	2.3	38	100
My school has computers with intelligent voice command using speaker and software specially designed for students with visual impairment.	30	78.9	6	15.8	2	4.5	38	100
I have access to the internet in my school, which I use for learning purposes.	31	81.6	6	15.8	1	2.3	38	100

Table 7 continued

I am allowed to use the computer in class.	8	21.1	29	65.9	1	2.3	38	100
My teachers give me special attention in ICT class.	32	84.2	6	15.8	0	0	30	100
My teachers give instructions using the computer.	17	44.8	21	55.2	0	0	38	100
I am allowed to use the computer in the examination hall.	0	0	38	100	0	0	38	100
I am given enough time to use the computer	19	50.0	16	42.1	3	7.9	38	100
I am given help when something goes wrong in my use of ICTs.	32	84.2	4	10.5	2	5.3	38	100

Source: Field Survey, 2014.

Table 7 shows that 23(60.5%) students indicated that their school do not have enough computers and its accessories for students with visual impairment. The result here is therefore in line with the assertion of Tamru (2005) that one of the problems facing the education of the visually impaired is the lack of basic means of communication and electronic infrastructure.

About 70% of the students responded that they do not learn with the help of computers and assistive tools in class. About thirteen per cent of the students responded that they learn with the help of computers and assistive tools. It is shown again in Table 7 that 30(78.9%) students responded that they study ICT as a subject in school, with 7(18.4%) responding that they do not study ICT in school.

From Table 7, 30(78.9%) students admit that the school has computers with intelligent voice command using speaker and software specially designed for students with visual impairment while 6 representing 15.8% responded 'no' to the statement indicating that the school does not have computers with intelligent voice command and the required software to enable them use the computers. With regards to internet and its usage for learning purposes, 31(81%) indicated that they have access to internet with which use for learning purposes. 6(15.8%) of students indicated that they do not have access to internet.

On the statement that students with visual impairment are allowed to use the computer in the class, 8(21.1%) indicated they are allowed to use the computer in the class room. A majority of 29 (65.9%) indicated that they are not allowed to use the computer in the class.

Also, 84.2% of the students showed that teachers give them special attention when it comes to ICT lessons while 6(15.8%) indicated that they are not given special attention in ICT lessons. The finding confirms teachers' conduct of giving students special attention to students with visual impairment in the school. This is agreed in the literature which has it that the educational implication of visual impairment mainly considers the extent to which an individual's visual impairment affects learning and makes special methods and materials necessary (Heward & Orlansky, 1980).

On the issue of teachers giving instruction to students with visual impairment using the computer, a majority of 21(55.2%) of the students indicated that teachers do not use the computer to give instruction. About 44.8% indicated that teachers give instructions using the computer.

Table 7 also shows that 19(50.0%) spend enough time to use the computer while 16(42.1%) students indicated that they are not given enough time to use the computer. About 7.9% of the students surveyed indicated that they do not know if they are given enough time to use the computer. Also, 32(84.2%) indicated that they are given help in their use of ICT tools when something went wrong while 4(10.5%) indicated that they are not given help when something goes wrong in their use of ICT tools.

Challenges that students with visual impairment face when using ICT tools

The third research question sought to find out the challenges students with visual impairment face in their use of ICT tools. Table 8 presents the

responses on the challenges students with visual impairment face while using
ICT tools

Table 8

Challenges That Students with Visual Impairment Face When Using ICT Tools

Item	Response									
	Yes		No		I Do Not Know		Total			
	N	%	N	%	N	%	N	%		
My school has adequate computers and their accessories specially designed for students with visual impairment.	10	26.3	23	60.5	5	13.2	38	100		
The resource center in my school has the necessary learning facilities students with visual impairment need to learn with.	34	89.5	0	0.00	4	10.5	38	100		
I am given enough time to use the computer for learning purposes at school.	19	50.0	16	42.1	3	7.9	38	100		
Government's attention on accessibility of ICT tools in my school is skewed in favour of sighted school.	23	60.5	7	18.4	8	21.1	38	100		
I have special software and hardware available to enable me use computers.	32	84.2	4	10.5	2	5.3	38	100		
I am afraid to use the computer.	5	13.2	32	84.2	1	2.6	38	100		
I have access to internet in my school.	21	55.3	16	42.1	1	2.6	38	100		
I have specially trained ICT teachers in my school.	31	81.6	6	15.8	1	2.6	38	100		

Source: Field Survey, 2014.

It is clear from Table 6 that 10 (26.3%) students answered yes to the statement that their school has adequate computers and their accessories specially designed for students with visual impairment while 23(60.5%) students answered no to that statement. This is therefore of a clear indication that a larger number of the respondents are indicating that there are not enough computers to meet the needs of students with visual impairment.

About 34(89.5%) students indicated that the resource centre in the school lacks the learning facilities students with visual impairment need to learn with while 4(10.5) of the students disagreed with the statement. This is therefore in agreement with Casely-Hayford and Lynch's (2003) assertion that the main fraction of funding for Special Education is used for the provision of food for special institutions. Most of the special schools are less-resourced and operate with inadequate basic learning materials. It can therefore be concluded that the school does not have special equipment for learners. The finding here also supports the assertion of Tsengu, Brodtkorb and Almnes (1996) cited by Lars (2000) that relevant educational materials aimed at enhancing academic achievement and skill acquisition like typewriters, current brailled textbooks, large print text book, computers, talking calculators, tape recorders and Braille machines, are either in short supply or completely absent. It can therefore be said that there are few of the expected facilities which are actually required to enhance effective learning in the schools with students with visual impairment.

On whether the students are given enough time to use the computer for learning purposes at school, 19(50.0%) respondents indicated that they are given enough time to use the computer while 16(42.1) disagreed to the statement with 3(7.9) showing no idea. This means that about half of the students are not given enough time to use the computer for learning purposes.

With responses on government's attention on accessibility of ICT facilities and tools, 23(60.5%) indicated that government's attention on accessibility of ICT facilities is skewed in favour of sighted students while 7(18.4%) disagreed with the statement. This is in line with the proposition of Dankwa (1997) and Parthmore (2003) that the provision of ICT facilities is skewed in favour of the regular schools.

On the issue of special software, 32(84.2%) students indicated that they have a special software which enables them to the computer while only 10.5% indicated that they do not have any special software. With 84.2% of respondents indicating that they have special software which enables them to use the computer easily, it can be said that the finding here is not in line with the assertion of Tom (2000) as cited in Lanbon (2011) that software and hardware for the visually impaired are sometimes not accessible.

Whether students with visual impairment are afraid to use the computer, 32(84.2%) students indicated that they are not afraid to use the computer while 5(13.5%) of the students indicated that they are afraid to use the computer. Computer anxiety or fear therefore cannot be said to be a key factor or obstacle, limiting or stopping the use of ICT by students with visual impairment.

On the issue of internet access, 21(55.2%) students showed that they have access to internet while 16(42.1%) of the students showed that they do not have access to internet. Table 8 further indicates that a higher percentage of the students in the school have access to internet.

Lastly on Table 8, 31(81.6%) students indicated that there are specially trained ICT teachers in the school. 6(15.8%) students indicated that the ICT teachers in the school are not specially trained. It can consequently be said that there has being good attempts to move towards full and complete integration of ICT use in the education of students with visual impairment. This is because a move of this kind requires a high quality training and professional development of teachers who would take charge of ICT in the education of students with visual impairment.

Impact of ICT tools on the academic performance of students with visual impairment

Table 9 presents the responses on the impact of ICT tools on the academic performance of students with visual impairment.

Table 9

Impact of ICT Tools on the Academic Performance of Students with Visual Impairment

Item	SA	A	D	SD	I Do Not Know	Total
	N	N	N	N	N	N
	(%)	(%)	(%)	(%)	(%)	(%)
ICT has a lot of relevance to students with visual impairment.	31 (81.6)	6 (15.8)	0 (0.00)	0 (0.00)	1 (2.6)	38 (100)
Students with visual impairment will understand lessons better if teachers use computers in their lesson delivery.	10 (26.3)	6 (15.8)	15 (39.5)	5 (13.2)	2 (5.3)	38 (100)
Ensuring ICT accessibility will motivate students with visual impairment to learn better.	25 (65.8)	13 (34.2)	0 (00.0)	0 (00.0)	0 (00.0)	38 (100)
Students with visual impairment will be able to communicate well with their teachers and schoolmate using the ICT tools.	23 (60.5)	9 (23.7)	3 (7.9)	3 (7.9)	0 (00.0)	38 (100)
Students with visual impairment will be able to search for learning materials themselves online using the internet.	27 (71.1)	10 (26.3)	1 (2.6)	0 (0)	0 (0)	38 (100)
Students with visual impairment will perform better if they are allowed to use the computer in their final examination.	14 (36.8)	12 (31.6)	6 (15.8)	5 (13.2)	1 (2.6)	38 (100)

Table 9 continued

ICT tools will ensure equity among students with visual impairment and sighted students	23 (60.5)	10 (26.3)	2 (5.3)	2 (5.3)	1 (2.3)	38 (100)
The use of ICT will enable students with visual impairment perform their daily life activities at home and in the schools well.	23 (60.5)	9 (23.7)	4 (10.5)	1 (2.6)	1 (2.6)	38 (100)
With skills acquired by a student with visual impairment, he or she will function well in his or her field of work in future.	26 (68.4)	11 (28.9)	0 (0.00)	1 (2.6)	0 (0.00)	38 (100)

Source: Field Survey, 2014.

It is clear from Table 9 that a greater percentage (97.4%) of the respondents indicated that they are aware of the relevance of ICT to students with visual impairment. Majority of the respondents agreed to the statement probably because they might have used ICT tools before and have recognized its relevance to their education. The result here is in line with the assertion of Abakah (2002) which states that the computer should be thought of as a tool whose effectiveness is determined by the user.

It is explicit from Table 9 that 16(42.1%) students responded that they will understand lessons better if teachers use computers in their lesson delivery while 20(52.7%) of the respondents disagreeing to the statement as the majority group. This suggests that the right methods and approaches are not in use even if teachers use computers in their teachings as noted by Sutherland et. al (2004) that ICT alone does not enhance learning. How ICT is incorporated into learning activities is what is important. Abbott et al. (2001) also indicated that students must be encouraged to understand the processes involved. It would seem that prerequisite for success is the subject knowledge of the teacher and his ability to connect the use of ICT into the current curriculum.

With regards to ICT and its motivation to students with visual impairment to learn better, all the respondents agreed to the statement that ICT accessibility will motivate them to learn better. This means that ICT can make a significant contribution to teaching and learning across all subjects and ages. Thus, it can engage and motivate children and young people and meet their individual needs. The responds here are in line with the assertion of Swarts (2006) as cite in Agyeman (2014) that ICTs can be powerful, essential tools

for learning: understanding, interpreting and communicating about the real world.

About 84.2% of the students indicated that students with visual impairment can communicate well with their teachers and schoolmate using ICT tools. On the statement, students with visual impairment will be able to search for learning materials online using the internet, 37(97.4%) indicated that students with visual impairment can search learning materials online using the internet.

Table 9 also shows that 26(68.4%) of the students agreed to the statement that students with visual impairment will perform better in examinations if they are allowed to use the computer in the examination hall. This as well is in an attempt to give grounds to the call made by the head of Information and Communication Technology (ICT) Department of the Wenchi Methodist Senior High School on the Ghana Education Service (GES) consider allowing students with visually impairment to use computers in their examination halls during their final exams.

About 33(86.8%) respondents agreed that ICT tools can ensure equity among students with visual impairment and sighted students while 4(10.6%) of the respondents disagreed to the statement. This therefore means that the students are of the view that ICT can purposefully to be used to meet students' individual needs in an inclusive settings through differentiated approaches that take learner diversity into account.

Out of the total number of respondents used in the study, 74.2% of the respondents were of the view that ICT can enable students with visual

impairment to perform their daily life activities at home and while in school. About 13 per cent of the respondents disagreed to the statement. In the same vein, 37(97.3%) students indicated that with skills acquired by a student with visual impairment, he or she will function well in his or her field of work. However, 1(2.6%) disagreed to the statement. It could be argued that a greater number of students with visual impairment see themselves as capable enough in their respective field of work, should they acquire skills in ICT and so far as education is concerned.

Summary

Chapter Four looked at the accessibility of ICT tools to students with visual impairment. The study showed that students involved in the study have an appreciably high level of understanding of ICT. In effect, they see ICT as a powerful and essential tool for learning which enhances one's understanding, interpretation and communication about the real world. They are also of the view that the educational implication of ICT tools to students with visual impairment is the extent to which special ICT tools, methods and other materials meet the educational needs of students with visual impairment.

The results of the study reveals that there is indeed some level of accessibility so far as students with visual impairment and ICT tools are concerned. Notwithstanding the levels of accessibility of ICT tools, there was a clear indication that there are some restrictions in students with visual impairments' use of ICT tools. It was found out that teachers do not use the computer in giving instructions. It was also noted that students with visual impairment are not allowed to use the computer in the examination hall.

Conclusion can be drawn from the finding of the study that ICT, when purposefully used will meet the needs of students with visual impairment in an inclusive settings through differentiated approaches that take learner diversity into account. The results of the findings suggests that ICT is capable of ensuring equity among students with visual impairment and sighted students. The result of the study also shows that people with visual impairment will be capable enough in their respective field of study and work, should they acquire skills in ICT.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter deals with the summary and major findings of the study. It also includes the conclusions drawn and recommendations made with regard to accessibility of ICT tools to students with visual impairment in Ghana.

Summary

The study became crucial because majority of blind and children with visual impairment are found at home while some are found on the streets begging for alms. It seems much attention has not been placed on the educational needs and desires of students with visual impairment. This is putting them in a dire predicament, characterized by nonexistence of education and widespread of unemployment of people with visual impairment in Ghana. This study was therefore to look at how these negative developments can be rectified through the use of accessible ICT tools. The researcher became interested in the topic when Lanbon (2011) conducted a study into the topic, “Assessing the Provision of ICT facilities to Visually Impaired Students in Ghana” but failed to place much attention how accessible ICT tools are to students with visual impairment.

For the purpose of this study, the population was all students with visual impairment in the Brong Ahafo Region of Ghana. The target population was the students with visual impairment in the Wenchi Methodist Senior High School of Brong Ahafo Region. This school was targeted because it is the only

school that takes charge of the education of students with visual impairment in the Brong Ahafo Region. The school had a total population of 40 students with visual impairment who were in S.H.S 2 and S.H.S 3 in the 2014/2015 academic year with the absence of those in S.H.S One. Students in S.H.S One were not included in the study because they had not admitted into the school at the time of data collection. The researcher sampled 38 respondents. They comprised for 20 male (52.6%) and 18 female (47.4%).

The instrument used for data collection was a questionnaire. The questionnaire consisted of closed-ended questions. It had five sections which examined Socio-Demographic Characteristics of the students, understanding of ICT to students with visual impairment, accessibility of ICT tools, the challenges students with visual impairment face when using ICT tools and the impact of ICT tools on the academic performance of students with visual impairment.

In all there were 47 items on the questionnaire for the respondents to answer. The researcher administered and collected the questionnaire in person after they were completed. All the copies of the questionnaire were completed and returned. This indicates 100% return rate.

The study was a descriptive survey. The variables were edited and coded with the help of SPSS version 21. Tables of percentile and frequency count were obtained to support the analysis. This helped to provide a quick visual impression on the values which enhanced the discussion and interpretation of the responses to all items of the instrument.

Key Finding of the Study

The results of the study are discussed in line with the research questions of the study and to correspond with the main items in research instrument. The study looked at the accessibility of ICT tools to students with visual impairment. The study revealed through the administration of questionnaire that:

1. ICT is taught as a core subject to students with visual impairment. Out of the total number of respondents, 23 representing 60.5% indicated that ICT is taught to them as a subject.
2. Although the school has a resource center, 89.5% of the students asserted that the school lacks the needed learning facilities.
3. Most of the respondents (76.3%) are of the view that ICT tools can be used to help students with visual impairment enhance their academic performance. It was also indicated by 73.7% of the respondents that there is the need for student with visual impairment to know how to use the computer.
4. Out of the 38 students who were involved in the study, 23 representing 60.5% of the student asserted that students with visual impairment and sighted students should attend ICT classes differently.
5. There is the need to allow students with visual impairment to use the computer in the examination hall at their final examination. Responses of 31, representing 81.6% of the respondents show that students with visual impairment wants to be allowed to use the computer in the examination hall.

6. Most of the students with visual impairment do not learn with the help of computers. Out of the total number, 31(70%) of the students responded that they do not learn with the help of computers and assistive tools in class.
7. Students with visual impairment are not allowed to use the computer in the classroom.
8. Teachers do not use the computer to give instruction and in their lesson delivery to the students with visual impairment in the schools.
9. There are inadequate number of computers in the school to meet the needs of students with visual impairment.

Conclusion

Grounded on the findings of the study, it has being revealed that there is no well-equipped Resource Center with ICT facilities that will enhance the teaching and learning process of teachers and students with visual impairment especially in inclusive schools such as Wenchi Methodist Senior High School. It has also being noted that accessible ICT tools are not evenly distributed to schools with students with visual impairment. The outcome of study shows that teachers do not incorporate the use of computers in their teaching methods and approaches to enhance the understanding of their lessons taught to students with visual impairment. Students with visual impairment as shown in the outcome of the study are not allowed to use the computer in their final examination. Students with visual impairment are not motivated and encouraged to learn with and from computers. There appears to be no national policy on students with impairment and ICT.

Recommendations

On the basis of the finding, the following recommendations were made:

1. The government should make ICT facilities accessible to student with visual impairment.
2. The government and NGO should ensure that ICT facilities are evenly distributed to all school including that of students with visual impairment.
3. Resource centers should be built and must be well equipped across the length and breadth of the nation to help enhance teaching and learning especially in schools of the visually impaired.
4. The Ministry of Education and the Special Education Division of Ghana Education Service should organize frequent in-service training for teachers to enhance teaching and learning of ICT in schools with students with visual impairment.
5. The Ministry of Education, the Ghana Education Service, West African Examination Council and other stake-holders should look into how the student with visual impairment can use the computer in their final examination.
6. Policy makers and other stake-holders should see to it that ICT is made a compulsory subject for students with visual impairment.

Suggestions for Further Research

From the findings of this study, it is suggested that the present study should be replicated in schools with students with visual impairment in other

regions of the country so that it would provide a basis for more generalization and conclusion since the current study is limited in scope because it was based only in the Brong Ahafo region of Ghana.

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APPENDICES

APPENDIX A

Krejcie and Morgan table for determining sample size from a given population.

<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>	<i>N</i>	<i>S</i>
10	10	220	140	1200	291
15	14	230	144	1300	297
20	19	240	148	1400	302
25	24	250	152	1500	306
30	28	260	155	1600	310
35	32	270	159	1700	313
40	36	280	162	1800	317
45	40	290	165	1900	320
50	44	300	169	2000	322
55	48	320	175	2200	327
60	52	340	181	2400	331
65	56	360	186	2600	335
70	59	380	191	2800	338
75	63	400	196	3000	341
80	66	420	201	3500	346
85	70	440	205	4000	351
90	73	460	210	4500	354
95	76	480	214	5000	357
100	80	500	217	6000	361
110	86	550	226	7000	364
120	92	600	234	8000	367
130	97	650	242	9000	368
140	103	700	248	10000	370
150	108	750	254	15000	375
160	113	800	260	20000	377
170	118	850	265	30000	379
180	123	900	269	40000	380
190	127	950	274	50000	381
200	132	1000	278	75000	382
210	136	1100	285	100000	384

Note.—*N* is population size. *S* is sample size.

Source: Krejcie & Morgan, 1970

APPENDIX B

UNIVERSITY OF CAPE COAST
College of Distance Education

Tel No: 03321 - 36947
Fax: 03321 - 36946
E-mail cce@ucc.edu.gh



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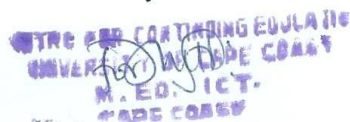
TO WHOM IT MAY CONCERN

This is to certify that **Mr. Franklin Osei-Antwi** with registration number **ED/MIT/13/0008** is pursuing a two year Master of Education Degree in Information Technology at the University of Cape Coast.

He is conducting a research on the topic “**Accessibility of ICT Facilities to Students with Visual Impairment: A case study in Brong-Ahafo.**”.

We will strongly appreciate any courtesy extended to him.

Thank you.



Dr. Paul Nyagorme
for: **Provost, CoDE**

APPENDIX C
UNIVERSITY OF CAPE COAST
MASTER OF EDUCATION (INFORMATION TECHNOLOGY)
A QUESTIONNAIRE ON THE ACCESSIBILITY OF ICT TOOLS TO
STUDENTS
WITH VISUAL IMPAIRMENT IN GHANA.
QUESTIONNAIRE FOR STUDENTS

Technological changes have made work and education complex, challenging and competitive. As a result, developing countries like Ghana is implementing the study and training of Information and Communication Technology (ICT) at all levels of learning.

I am a student of University of Cape Coast pursuing Master's In Education (information Technology). The purpose of this questionnaire is to gather data to find out whether ICT facilities have been made accessible to students with visual impairment in schools in the country and whether these visually impaired students are benefiting from ICT facilities.

Your responses to this questionnaire would be used for academic purpose only and hence any information provided will be treated as private and confidential.

Thank you.

PERSONAL DATA

Please tick (✓) in the appropriate boxes provided.

1. Gender: Male [] Female []
2. Age: 14 and below [] 15 – 20 [] 21-25 [] 26- 30 []
3. Class/Level: S.H.S One(1) [] S.H.S Two (2) []
S.H.S Three(3) []

THE UNDERSTANDING OF ICT TO STUDENTS WITH VISUAL IMPAIRMENT.

Please tick (✓) in the appropriate boxes provided for each of the statements the extent to which you agree or disagree to the assertion made below.

(SA- Strongly Agree, A-Agree, D- Disagree and SD- Strongly Disagree)

Item	Statement	SA	A	D	SD	I Do Not Know
4	ICT is one of the core subjects for students with visual impairment.					
5	ICT can help students with visual impairment to enhance their academic performance.					
6	Students with visual impairment should know how to use the computer					
7	Students with visual impairment need ICT					

	facilities to learn					
8	Students with visual impairment should attend computer classes with their sighted colleagues					
9	Students with visual impairment in schools require voice recorders and other assistive technologies to learn.					
10	Students with visual impairment in schools are often sidelined by their sighted friends in the use of computers and in ICT lessons.					
11	Classrooms, computer laboratories and dormitories should be built with due consideration of the visually impaired in the school.					
12	Students with visual impairment in schools need to know how to use the internet.					
13	Schools with students with visual impairment should be connected to the internet.					
14	Students with visual impairment should be allowed to use computers in the examination hall.					
15	Teachers in schools with students with visual impairment should use computers in their lesson delivery.					
17	Students with visual impairment require special software like JAWS to enable them to					

	use the computer easily					
18	Making accessibility of ICT facilities to students with visual impairment will motivate them to learn better.					
19	Students with visual impairment are aware of the contributions of ICT to their education					

HOW ACCESSIBLE IS ICT FACILITIES TO STUDENTS WITH VISUAL IMPAIRMENT IN SCHOOLS IN GHANA?

Please tick (✓) YES, NO or I Don't Know to the statements in the table below to show your agreement of disagreement to the statements.

Item	Statement	Yes	No	I Do Not Know
20	My school has enough computers and its accessories needed by students with visual impairment.			
21	I learn with the help of computers and assistive tools in class.			
22	I study ICT as a subject.			
23	My school has computers with special keyboard to enable me type the letters on the key board.			
23	My school has computers with intelligent voice command using speaker and software specially			

	designed for visually impaired students.			
24	I have access to the internet in my school, which I use for learning purposes.			
25	I am allowed to use the computer in the classroom.			
26	My teachers give me special attention in ICT class			
27	My teachers give instruction using the computer.			
28	I am allowed to use the computer in the examination hall.			
29	I am given help when something goes wrong in my use of ICT tools.			

**CHALLENGES THAT STUDENTS WITH VISUAL IMPAIRMENT
FACE WHEN USING ICT TOOLS**

*Please tick (✓) YES, NO or I Do Not Know to the statements in the table
below to show your agreement of disagreement to the statements.*

Item	Statement	Yes	No	I Do Not Know
30	My school has adequate computers and their accessories specially designed for students with visual impairment.			
31	The resource center in my school lacks the learning facilities students with visual impairment need to learn with.			
32	I am given enough time to use the computer for learning purposes at home and at school.			
33	Government's attention on accessibility of ICT facilities is skewed in favour of sighted students in my school.			
34	I have special software available to enable me use computers.			
35	I am afraid to use of computers.			
36	I have access to internet in my school.			
37	I am encouraged to make use of ICT tools.			
38	I have specially trained ICT teachers in my school.			

IMPACT OF ICT ON THE ACADEMIC PERFORMANCE OF STUDENTS WITH VISUAL IMPAIRMENT IN SCHOOLS

Please *tick* (✓) in the appropriate boxes provided for each of the statements the extent to which you *agree* or *disagree* to the assertion made below.

Item	Statement	SA	A	D	SD	I Do Not know
39	ICT has a lot of relevance to students with visual impairment					
40	Students with visual impairment will understand lessons better if teachers use computers in their lesson delivery.					
41	Ensuring ICT accessibility will motivate students with visual impairment to learn better.					
42	Students with visual impairment will be able to communicate well with their schoolmates and teachers using the computer.					
43	Students with visual impairment will be able to search for learning materials themselves online using the internet					
44	Students with visual impairment will perform better if they are allowed to use the computer in the examination hall in their final examination.					
45	ICT will ensure equity among students with					

	visual impairment and sighted students in educational opportunities and employment.					
46	The use of ICT will enable students with visual impairment perform their daily life activities at home and in the school well.					
47	With skills acquired by a student with visual impairment in ICT, he or she will function well in his or her field of work using the computer.					

Any other comments or suggestions:

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