UNIVERSITY OF EDUCATION, WINNEBA

SPECIAL EDUCATION TEACHERS' PERCEPTIONS OF USING ASSISTIVE TECHNOLOGY IN EDUCATING STUDENTS WITH SPECIAL NEEDS IN NORTHERN REGION-GHANA

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B.ED SPECIAL EDUCATION (EDUCATION OF PEOPLE WITH MENTAL RETARDATION) AND SOCIAL STUDIES

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DECLARATION

CANDIDATE'S DECLARATION

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

Candidate's Name: Alhassan Zakaria

Signature... Date...

SUPERVISOR'S CERTIFICATION

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

Supervisor's Name: Prof. Grace Yawo Gadagbui

Signature... Date...

DEDICATION

This dissertation is dedicated to my late mother, Ncheti Lamihi, who was my main source of inspiration; may the Almighty be please with you, my beloved: Rukaya and Sanatu, and my children, Rashida, Anisa and Ruhema; my friends, Sayibu Abdulai, Tahidu Alhassan, and Inusah Abdul-Latif (Aljazeera), who in diverse ways provided immensurable support to me during the writing of this project.

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ABSTRACT

The purpose of the study was to examine how special education teachers perceive and use of assistive technology in educating persons with special needs in (state the number of schools here; e.g., 5 schools) selected schools in the Northern Region, Ghana. A descriptive research design was used for this study. Fifty teachers were randomly selected 5 special schools in the Northern Region of Ghana for the study. The instruments used to collect the data were questionnaires and interviews. The data was presented on SPSS tables and analyzed by calculating the standard deviation and the means of the responses. The results indicated that most teachers in the schools had positive opinions about the use of assistive technology, but they had inadequate knowledge and skills of the use of assistive technology. Teachers agreed that assistive technology were very effective in the teaching of persons with special needs. It was also proven that teachers encountered a lot of challenges in using assistive technology. However, the female teacher' faced more challenges than their male colleagues. Recommendations were made to include, more training in assistive technology to enhance teachers' capacity in order to adequately support children with special educational needs in Ghana. To address the problem of non-availability of some assistive technology which currently make it difficult to effectively teach children with special needs in the Northern Region, Government and for that matter the Ministry of Education and Ghana Education Service as well as the Special Education Division should collaborate to support the special schools in the Northern Region to acquire some assistive technology. Again, in terms of repairs, the Government of Ghana can help train

a set of interested individuals who will readily assist the teachers in maintaining and repairing their devices instead of dumping them when they breakdown. Fresh courses on the acquisition and use of assistive technology should also be introduced into the school curriculum for special education teachers to possess these skills and abilities before being posted to the classroom.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

According Robitaille (2010) Assistive Technology (AT) existed since time in memorial and various devices were used to support persons with disabilities. She indicated that in the beginning people with hearing impairment used bullhorns to facilitate hearing one another. For example, Robitaille (2010) claimed that Alexander Graham Bell, invented telephone in the 1870s. This invention was as a result of developing a device to support his wife who was deaf and ended up developing a telephone. In a similar vein, people with visual impairment had hard times to read and write until 1824 when Louis Braille developed Braille code. Also in 1975, Ray Kurzweil developed "talking" reading machines, which made easy for people with visual impairments to have access to printed material (Robitaille, 2010). In the 1970s Vanderheiden, a Professor at the University of Wisconsin-Madison, developed Auto-Corn, one of the first communications devices for people with dumb (Robitaille, 2010). All those inventions are considered AT in this modern time are considered AT in the modern world, is very crucial in all human endeavors as everyone needs support in one way or the other to enhance performance.

In Ghana, there have always been reform or policy initiatives by successive governments. A significant aspect of these reforms and policies has been that education for all addresses the needs of learners with disabilities. Gadagbui, (1998), states that the free compulsory Universal Basic Education (FCUBE) is derived from the working of the 1992 Constitution of the Republic of Ghana, which gave rise to the inclusion of children with disabilities in the general education

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system. Gadagbui further stated that the FCUBE policy aimed at expanding, strengthening, and making education accessible for all children. Section 17 of the Ghana Disability Act of 2006 (Act 715), stated:

> the minister of education shall by Legislative instrument designate schools or institution in each region which shall provide the necessary facilities and equipment that will enable persons with disability to fully benefit from the school or institution.

According to Curry (2003), assistive technology (AT) is:

> any piece of equipment or product system, whether acquired commercially off the shelf, modified or customized, that is used to increase, maintain or improve the functional capabilities of a child with a disability.

These devices facilitate the effective engagement or involvement of students with disabilities in activities or tasks that ordinarily would not have been possible for them. Flanagan (2013) maintains that technology has the potential to improve education for all students. For students with disabilities, the potential of technology to support learning may be even greater, as it has the potential to level the playing field in academic tasks (Scherer, 2004). Although AT offers noted advantages, teachers are often faced with the associated costs, and lack of access and training offered for both themselves and their students (Lee & Vega, 2005; Ludlow, 2001; Todis, 1996). These authors observed that, while teachers acknowledge the potential of AT, they are also daunted by the responsibilities of understanding and using AT with their students (. While in-service special education teachers may have had AT coursework during their

undergraduate or graduate education, few workshops or professional development opportunities exist outside of coursework to continually support teachers' use of AT during instruction (Derer, Polsgrove, & Rieth, 1996; Lee & Vega; Ludlow; Michaels & McDermott, 2003).

In Ghana, people like Clement Ntim, the principal of Nkawkaw Unit School, has taken the lead in implementing a number of augmentative and alternative communication (AAC) tools and techniques in a special needs classroom. His successes, failures, and the lessons he has learned, suggest that, using AAC materials appropriately in a low-environment will succeed in Ghana's special needs classrooms, if AAC materials meet three stringent requirements. AAC materials must be (1) low-cost, (2) easy to use, and (3) helpful to students in their everyday lives. Clement's school in Ghana receives approximately four US dollars per child per semester. Classroom computers and high-tech assistive technology from richer countries are not yet relevant. Nor are there trained specialists in Ghana to program or develop high-tech solutions or provide classes on AAC. AAC approaches always need to fit local conditions and realities. For example, one of the early uses of AAC in Ghana's special needs classrooms involved making communication passports and market place communication cards. These allowed students to shop in the market for their families (Streight, 2012). Also, Ghana's Unit School Teachers of the Special Education Division, which the researcher is part of, in collaboration with the Ministry of Education, has built a relationship with some senior AAC specialists in speech-language pathology from Teachers' College of Columbia University. This annual conference comes off in the first week of the beginning of every year. The program is about five years old now. However, the researcher joined this group only a year, and 1go-has developed keen interest, which has further motivated him to conduct this caliber of research.

According to Dell, Newton, & Petroff (2008), various researchers have found a number of factors perceived by teachers about the use of AT in educating persons with special needs. They argued that although policy makers have made attempt at addressing challenges teacher face in using AT in schools, students do not benefit from instruction due to teachers' inability to use AT to enhance students' understanding and participation. These researches were not conducted in Ghana, therefore, there is the need to conduct study to find out how special education teachers in Ghana perceive and use AT. This will enable teachers to understand the importance of AT in teaching students with disabilities, and to use AT to improve upon their teaching skills. Also, it will enable policy-makers to better understand the relevance of AT in special education, and how special education teachers tend to attach AT to their teaching in order to assist students with special needs learn at school.

1.2 Statement of the Problem

Prior to the study, the researcher had observed that, even though there were a lot of communicative, manipulative, learning and mobility devices available to increase, maintain or improve functional capabilities of individuals with special needs, some teachers were not privy to those devises. Again, there was ample evidence to support the importance of assistive technology in teaching students with special needs, especially, in inclusive classroom settings, but teachers in the Northern region did not seem to be aware. Students with special needs often leave classrooms merely because they do not benefit from the instruction. The use of technology would, most likely, boost their participation and understanding. It appears that, special education teachers do not patronize the use of these devices in some special schools in the Northern Region

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of Ghana. This has negatively affected effective teaching and learning, and this prompted the researcher to conduct the study.

1.3 Purpose of the Study

The main purpose of the study was to examine how special education teachers perceive and use AT to train persons with special needs in some special schools in Northern Region-Ghana.

1.3.1 Objectives of the Study

a) To investigate special education teachers' opinion on the use of AT in teaching children with special needs in some school in the Northern region of Ghana.

b) To investigate special education teachers' knowledge and skills about the use of AT in the classroom in some special schools in the Northern region of Ghana.

c) To examine the effectiveness of the use of AT in educating persons with special needs in some special schools in the Northern region of Ghana.

d) To describe the challenges special education teachers encounter about the use of AT in some selected schools in the Northern region of Ghana.

e) To assess the differences between female and male special education teachers' opinions, knowledge, and effectiveness, as well as challenges encountered in using assistive technology.

1.4 Research Questions

1) What are special education teachers' opinions on the use of AT in teaching children with special needs?

2) What knowledge does special education teachers have about AT?

3) What effectiveness has AT in educating persons with special needs?

4) What challenges do special education teachers encounter when using AT during lessons?

1.5 Hypothesis

H_0: There is no significant difference between the challenges female and male special education teachers' encounter in using AT.

H_A: There is a significant difference between the challenges female and male special education teachers encounter in using ATs.

1.6 Significance of the Study

It will expose various assistive technologies available in the special schools where study was conducted. The findings will provide information to teachers and school administrators as to what should be done to utilize technology appropriately to benefit students with disabilities. It will also expose the use of technologies in our special schools. This will help teachers to better use these technologies to support and address the learning problems of persons with special needs. In addition, it will expose various challenges that hinder the use of ATs in classrooms, so that those issues can be addressed.

1.7 Delimitations

Though there were many special schools in Ghana, the study was delimited to teachers dealing with persons with special needs in the Northern Region. Specifically, five special schools were used. The schools include; Yumba Special School in Tamale, Tamale Rehabilitation

Centre, Dakpema Unit School in Tamale, Savelegu School for the Deaf at Savelegu, and Sugri Unit School at Walewale. The study was, specifically, conducted to seeking answers to the following questions:

a) What are special education teachers' opinions on the use of ATs in teaching special needs children?

b) What are special education teachers' knowledge and skills about the use of AT?

c) What is the effectiveness of ATs in educating persons with special needs?

d) What are challenges special education teachers encounter about the use of AT?

1.8 Limitation

The main limitation to the study was that most of the teachers were not at post at the time of the collection of the questionnaires, and this reduced the return rate. Fifty questionnaires were received in return, instead of 63 administered. Even though, the questionnaire return rate fell short by 13, the 50 returned questionnaire were adequate to represent the opinions majority of the teachers. Hence it did not affect the work negatively.

1.9 Organization of the Study

The study is organized under five main chapters. Chapter one is made up of introduction to the study, statement of the problem, purpose of the study, objectives of the study, delimitation, limitations and definition of terms. In chapter two, related literature is reviewed. Chapter three discusses the methodology. This involves the research design, populations, sample and sampling, instrumentation, procedures for data collecting and data analysis. Chapter four presents analysis

and discusses the findings, while chapter five entails summary, conclusion, recommendation and suggestions.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This section reviewed related literature of earlier studies conducted on teachers' perception of using AT in educating persons with special needs. The reviewed literature also includes theoretical framework, empirical evidence conceptual framework and summary. The areas discussed were:

- Theoretical framework

- Concept of AT

- Special education teachers' opinion on the use of ATs in teaching special needs children.

- Special education teachers' knowledge and skills about the use of AT.

- Effectiveness of AT in educating persons with special needs.

- Challenges special education teachers encounter about the use of AT

- Empirical evidence

- Conceptual framework

- Summary

2.1 Theoretical Framework

This study utilized David Wiles (2000) theory known as 'Model of Human Performance Technology'. Wiles studied five common models of human performance technology and sought to reconcile the differences through a normalization process to produce a synthesis of the many dimensions that have been identified as contributing to performance (see Figure 1). Wiles' analysis suggests that performance can be affected by seven variables, namely, (1) organizational systems, (2) incentives, (3) cognitive support, (4) tools, (5) physical environment, (6)

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skills/knowledge, and (7) inherent ability. The variables can be viewed as part of two classes: those that are internal to the performer (#6 & #7) and those that are external (#1, #2, #3, #4, #5). Furthermore, the external variables can be understood as part of environmental factors, or intangibles, (#1 & #2) and resources, or tangibles (#3, #4, & #5). Performance problems may be traced to a single variable or a combination. In Wile's estimation, the variables are sequenced in their ease of remediation (i.e., problems related to organizational system variables (#1) are easier to modify than problems associated with intrinsic abilities (#7)). This model helps us understand that technology is not a simple panacea for remediating performance problems. For example, if the issue is really that an individual lacks the incentive to complete an academic task (#2), performance may not improve despite the availability of a technology tool (# 4). Likewise, when a tool (#4) is only available in one environment (#5), performance gains will be limited.

Figure 1: Wisles Model of Human Performance Technology (2000)
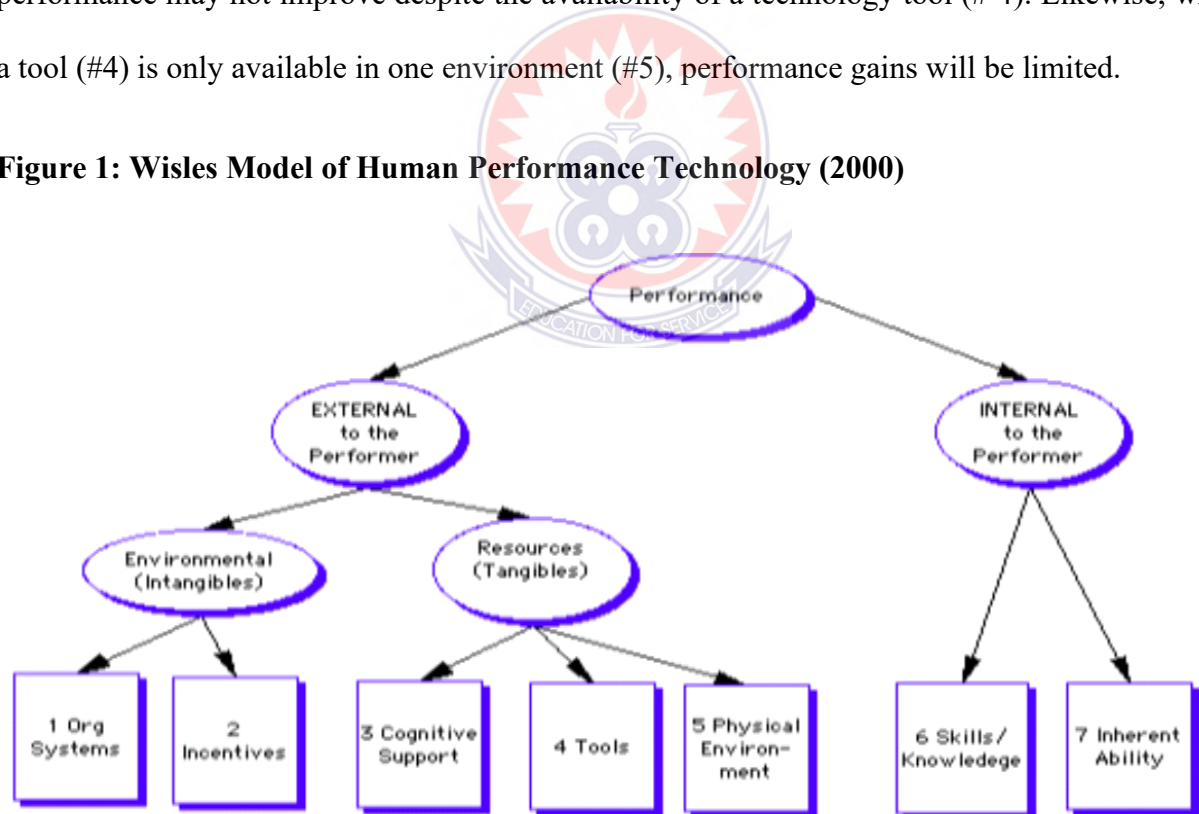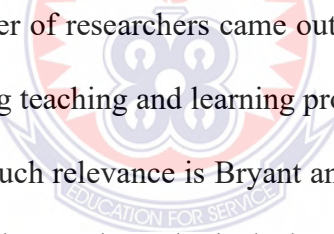
At the heart of his theory, there is performance and this performance depends on two factors. The factors are internal and external one is external factors- these includes factors that

are outside human psychological and inherent ability. And the other which is internal factors that include human competency in terms of skills/ knowledge and inborn abilities. With the former (external factors) they are further grouped or divided into five variables; organizational system, incentives, cognitive support, tools, and physical environment. These variables, according to David Wiles (2000), are important external factors that contribute to human performance. With the later, skills/knowledge and inherent ability are the internal factors that leads to successful human performance. Blending of these two major factors (external and internal factors) help us to understand how technology is used to support human performance.

2.2 Concept of Assistive Technology (AT)

History of Assistive Technology

In the area of AT, a number of researchers came out with valuable inputs. These inputs contributed immensely to improving teaching and learning process of persons with special needs. One think tank whose work is of much relevance is Bryant and Bryant (2011). He came out with three periods of assistive technology Chronological development: thus, foundations stage establishment stage and the empowerment stage. Throwing light on the foundation stage, (prior to 1900), he believed that 'mans initial effort to support an injured person was the stick. This a period described as Stone Age. (Cook & Hussey, 2002) maintained that, in the 17th and 18th centuries respectively, wooden leg and a metal hook that enabled some pirates to discharge their work. This same personality opined that the blind and partially blind were supported with Braille for literal work. They further added that photograph was introduced to assist persons with hearing challenge for purposes of recording by Edison in 1836. The establishment stage saw the promulgation of laws, polices, institution and programs to take care of the needs of persons with

disabilities such as The Soldier Rehabilitation Act, the Frame- folding wheelchair and the Hoover Cane, Council for Exceptional Children-CEC, and the Learning Disabilities Association-LDA. All these were established in 1918, 1922, 1937, 1947 and 1963 respectively. These all occurred within the period 1900 to 1972 according to (Cook & Hussey cited in Alkahtani, 2013).

2.2.2 Definitions of Assistive Technology

According to Govinder (2009), the term "assistive technology" encompasses a broad range of assistive devices from "low tech" to "high-tech" learning tools. To him, low-tech includes pencil grips, highlighters, paper stabilizers and high tech includes computers, voice synthesizers and Braille readers. Furthermore, Rose, Hasselbring, Stahl, and Zabala (2005) point out that assistive technology devices are any item, piece of equipment, or product system (software) used to increase, maintain, or improve the functional capabilities of a student with disabilities. Borg, (2007) indicates that assistive technology can be defined as any piece of equipment, or product whether it is acquired commercially, modified, or customized, that is used to increase, maintain, or improve the functional capabilities of individuals with disabilities. The importance of AT cannot be over emphasized since its absence is surely going to deny many students from education. Simply put, such students would not be in the position to access educational programs without the use of ATs. According to Ganschow, Philips and Schneider (2001), assistive technology devices are put into three categories these are:

a) Low-tech. This is the first of the three devices which is characterized by the use of non-electronic. It is easy to use because it involves little or no training before one can use it. It is also supper to not that this low-tech device is widely available with low cost and

minimal or no maintenance at all. A notable example of a low-tech is a pencil grip, highlighter tape or pens, and adapted furniture.

b) Mid-tech. This is a device that is easy to manipulate by the use of electronics even with little amount of training. Comparatively, a mid-tech devices are commercial available and affordable. At the market, the prices of mid-tech device are not beyond the rich of individuals. Adapted keyboard, electronic dictionaries, digital recorders are all this type of device.

c) High-tech. contrastingly this device involves complex electronics and normally contain micro computer component. This property enables it the ability to store and retrieve information. Example, word prediction soft ware, talking calculator and hearing aids. The view held by both Cook and Hussey cited in Alkahtan is that, yesterday high-tech is tomorrow's low-tech. Also, they acknowledged that as knowledge increases and expands in the AT, new areas would be explored and this could create new ways of classifying A.T. (Alkhtani, 2013).
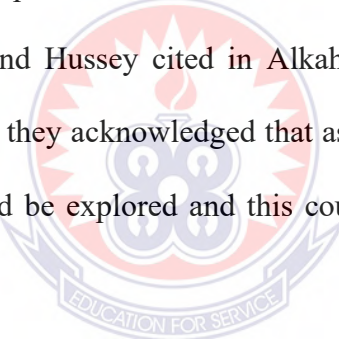
2.3 Types of Assistive Technology

According to Rakes, Fields, and Cox (2006), teaching materials based on ICT, mechanical devices and/or printed paper, all aim to fulfill a double purpose. Firstly, there is a target to fulfill the function which they are designed for; and secondly, they serve as a means for inclusive education. It is important to think through and draw practical consequences deriving from the close functions between these two. The types of assistive technology in the classroom may be in place to aid in the following areas: Computer Access, Composing Written Material, Communication, Mobility, and Vision.

2.2.4 Computer Access

Computer technology and the Internet have at great potential to broaden the lives and increase the independence students with special needs (Kaye, 2000). Those who have difficulty leaving their homes for the classroom can now log in and attend lectures online, research health questions, participate in online discussions, catch up with friends, or make new ones. Students with visual impairments and blindness, who used to wait months or years for the information they needed to be made available in Braille or on audiotape, can now access the very same news stories, magazine articles, government reports, and information on their education at the very same time it becomes available to the sighted population. People who have difficulty holding a pen or using a keyboard can use the latest speech recognition software to write letters, pay their bills, or perform work-related tasks. If a student cannot access the computer in its standard form and they need it to perform academic tasks, this technology helps come along with word prediction, switches, voice recognition software, alternate keyboards and pointing options (Kaye).
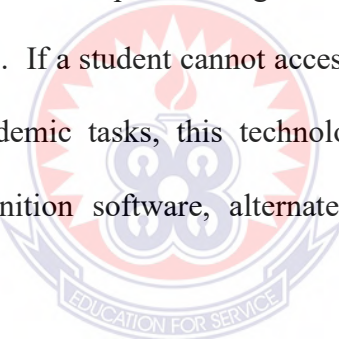
2.3.1 Assistive Technology for the Composing of Written Material

Writing is a complex process that involves both the physical mechanics of handwriting and the cognitive component of organizing, creating or composing written material. Pyryt (2009) identify the Student, Environments, Tasks, and Tools (SETT) process and decision making guide as a tool that may assist students in overcoming or adapting to the writing obstacles they face. Zabala (1995), a renowned educationist propounded his theory called SETT. According to him, SETT is an acronym for Student, Environment, Task and Tools. These letters in SETT form a memorable word and therefore not intended to imply in an orderly manner. He added that, it was

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almost impossible to be used because they are closely intertwined. The SETT framework was designed to help the process of gathering, organizing, and analyzing data to ensure a concerted problem solving and decision making in connection with technology and appropriate educational programming for persons with special needs. He further explained that there was the need to gather information about the students' ability and needs so that the best support measure can be meted out. Also, the Environment in which the student lives should be checked to ensure availability of materials and equipments, physical, instructional arrangements and what support are available for students. Task, as the third letter in the acronym tries to look at various activities that take place in the Environment, how it supports the student curriculum, the critical elements of the activities, the activities to be modified to accommodate the student and how technology support the student participation. Finally, the Tools seek to find out strategies that might be used to increase student's performance. This enables the teacher to consider whether to use low-tech, mid-tech or high-tech in developing a system for a student and also how these tools can be tested out with the student in the environment in which they will be used. When the SETT is taken into consideration, the teacher will be in a better position to satisfy the needs of individuals. People with handwriting problems may not necessarily require the same AT (Pyryt, 2009).

2.3.2 Communication Aids

Communication aids and devices are needed if a student shows a documented difference between comprehension of language and ability to express it, demonstrates delayed expressive language, or if their speech is not understandable to those around them. Pyryt (2009) says that everyone has specific ways by which they communicate, and preferred methods of communication. Accent and tone in speech or written text can be interpreted in different ways

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and can influence how the recipient perceives the message. However, not everyone has access to these more subtle forms of communication. The following list details various popular forms of alternative communication:

2.3.3 Braille

Braille is a method of reading by touch, which is used by people with visual impairments. Braille letters are made of raised dots and are usually written on Braille paper or sheets.

2.3.4 Easy Read

Easy Read is an accessible information format. It is mostly used by people with learning difficulties, as well as other groups like older people and speakers of other languages. *Easy Read* does two main things; making the words used simpler and using pictures, such as photo symbols alongside the words.
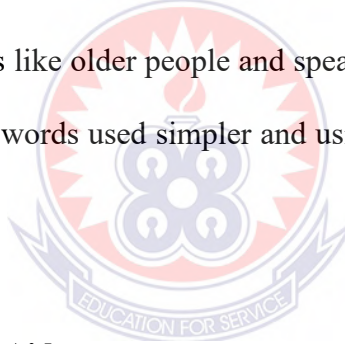
2.3.5 Electronic Communication Aids

Electronic Communication Aids may be used alongside, or instead of, other systems, such as paper based charts, signing systems, and so on. Few people with communication impairments will use only one particular method of communication, and in most cases, somebody using an electronic aid will reinforce its message with gesture, head movement, and other communication strategies. Many users, who are able to write more complex words using a machine, allow them to type in messages which the machine then turns into speech using speech synthesis. Increasingly, portable computers are being used as electronic communication aids by running specialist software. This operates in much the same way as the purpose-built

communication aid. Computers can provide the user with access to a wider range of options. For example, a child in school can use the computer both as a communication aid and as a method of accessing the curriculum.

2.3.6 Deaf-blind Manual Alphabet

Deaf-Blind Manual Alphabet is designed for use by people who are deaf blind. Sometimes, wrongly known as finger spelling, it is a method of spelling out words onto a hand of a person who is deaf blind.

2.3.7 Widget Symbols

Symbols are pictorial support for written language. They have been developed over the past 25 years and contain more than 10,000 symbols, which cover an English vocabulary of over 40,000 words. The symbols each illustrate a single concept, and cover a range of topics wide enough to make them suitable for symbol users of all ages and abilities. The Widget Symbol Set is designed specifically for written information, so users can develop a real independence in their reading and writing. They follow a schematic structure facilitating independent vocabulary development.

2.3.8 Picture Exchange Communication System (PECS)

Picture exchange communication system (PECS) is a form o augmentative and alternative communication. It is typically used as an aid in communication for children with autism and related impairments. PECS is designed to teach functional communication with an initial focus on spontaneity. It is implemented in a variety of settings (home, school, community) so users have the skills to communicate their wants and needs. PECS does not require complex

or expensive materials since it uses picture symbols. Research has shown that many preschoolers using PECS also beginning development.

2.3.9 Visual Aids

Children love gadgets and will enjoy seeing some of the fascinating adaptive equipment that has been developed for use by people with visual impairments. There are spectacles, wristwatches and wallets that talk, balls that beep, and electronic advices that expand mobility (Alper & Raharinirina, 2006).

2.3.10 Mobility Devices

Mobility devices are designed to facilitate or enhance a user's personal mobility. This relates to their ability to change and maintain body position, and walk and move from one place to another (WHO, 2001). Common examples include crutches, walking frames, wheeled walkers, wheelchairs (manual and powered), tricycles, scooters, such as calipers, braces and splints, and prostheses, such as artificial legs. Devices, such as white canes, are also considered mobility devices, as they assist people with visual impairments to move independently within their homes and communities. Mobility devices are appropriate for people who experience mobility difficulties as a result of broad range of impairments including cerebral palsy, poliomyelitis, muscular dystrophy, spinal bifida and visual impairment. Studies have shown that assistive technologies, when appropriate to the user and the user's environment, have a significant impact on the level of independence and participation, which people with disabilities are able to achieve (WHO, 2011). The WHO reports further that mobility devices help reduce the need for formal support services as well as reduce the time and physical burden for caregivers (Allen, Resnik, &

Rey, 2006). The use of mobility devices, in particular, creates opportunities for education and work, and contributes to improved health and quality of life (Eide and Oderud, 2009; May-Teerink, 1999; Shore, 2008). Mobility devices may also have an impact on the prevention of falls, injuries, further impairments and premature death. Investments in provision of mobility devices can reduce health-care costs and economic vulnerability, and increase productivity and quality or life (Cutter, 2010).

2.4 Special Education Teachers' Use of Assistive Technologies in Classrooms

Assistive technology (AT) must be subject to continuous change and what once aided a student previously may not aid them today. Suiting the assistive technology to the student is a very personal and individualized experience. Mishra & Koehler (2006) explained that different tools work for different students, just as various teaching strategies are used to meet the needs of a varying student base. As such, assistive technologies can indeed aid students with a broad range of learning disabilities, and these technologies can help people of all ages and needs. Taking the time to find the appropriate tools that work for an individual can provide great success; and not providing these tools would serve against our greater educational goals of equality and fairness (Watts, O'Brian & Wojcik, 2004). Appropriate integration of ICT allows students to access and analyse effectively a wider range and a greater quantity of information in more media than ever before. ICT encourages students to reflect on their perceptions of time and space. They interact with one another and with the world beyond their schools.

2.5 Special Education Teachers' Opinion on the Use of Assistive Technologies

Nowadays, heads of educational set ups or proprietors in the case of private schools are providing tuition to students of special needs in all kinds of structures. The diversity of needs of students compels teachers to arm themselves with variety of materials in order to provide satisfactory services. As educators, our primary concern is to get rid of any obstacle that would hinder the progress of students . This is done with the use of various devices of the assistive technology in the classroom.

Currently, educators in schools are instructing growing numbers of children with special needs in both self-contained and regular classroom settings (Poel, 2007). By trying to make the curriculum accessible to all students, teachers are incorporating a wide variety of tools in order to satisfy the wide range of needs that students require (Poel, 2007). Educators must sidestep barriers that may stand in the way of students' success by implementing various assistive technologies in the classroom (Adedokun, 2010).

From Adedokun (2010) observed that the greatest misconception by many educators regarding A.T. is the feeling that it is "high-tech". Sadly, any time mention is made of A.T. what readily comes to mind is the computer- which must necessary be so. The reason and reality are that long time ago, low-tech A.T.. It is further noted that, any technology that is instructive and serve as a means through which information of any sort is obtained becomes A.T. Eye classes, cane, highlighters, wheelchairs, calculators and pencil grip are all example of "low-tech" A.T. On the other hand, speech to text software, calculators that talk and voice activated computers are examples of "high-tech A.Ts. Disability Association of Canada (2003), lament seriously about the limited use of A.Ts in schools. For instance, they observed that this tech is not a better means to aid students to learn especially the disabled. The important fact to note here however is that any tool that aids

a student to receive a fair and just education should not be misconstrued and tracts names naming. The simplicity of the matter is that, much as a person with walking disability needs assistive technology to aid him or her overcome learning impediments. For instance, a student with visual impairment can be provided with Braille in reading lesson which would aid the student in the learning process. Also, depending on the given circumstances a learning material can be converted to an auditory material which can be very useful to students. Different disabilities need different tools to help such individuals circumvent their disabilities. This in fact must not be mistaken as a form of luxury for such people. After all what is the luxury ones two feet? Perhaps, the sense of luxury lies in the fact that such individuals become independent and self- reliant. It is observed further that A.T. encourages creativity and problem solving by students. Ideally, it should not be assumed that one particular tool can be an aid to all disabilities. Indeed, disabilities are quite different from one another and therefore one must not pretend that particular tool used for one particular impaired student can be applied conveniently and appropriately for another. Hence , the need for a continuous change since there are individual differences in students base on social factors such as sex , age, experience and what have you. In this regard, many writers in this field such as Watts, O' Brian, Lewis, Wojeik advocate the need to create tools that are suitable for an individual and can provide a greater success in the pursuit of education and the general goal of fairness and quality for all. Though, the challenge and limitations of A.T. devices listed above are genuine, yet its important in the field of special education can be over emphasized. Nevertheless, it is noted that having access to the tool does not matter much compare to factors such as the selection, acquisition and usage of the tool to the individual. Lin (2007) and Edyburn (2005), contends that in the use of a particular tool, not only should one consider the needs of the individual and the environment but also consideration must

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be given to the constantly new development in the broader field of A.T. There is yet another distinction in feature between the low-tech devices and the high-tech devices. The low-tech devices, we are told has minimal moving parts and are passive in nature. The high-tech on the other hand is complex, have an electronic component and require some amount of training and understanding (Lahm, 2006). In order for a harmonious use of the A.T. devices, there should be the need for training, support and awareness amongst all the stakeholders in the field of education.

2.6 Special Education Teachers' Knowledge and Skills about the Use of ATs

Ozoji (2002) submitted that environmental engineering is relevant in the field of special needs education. According to him, the exceptional child learning environment should be appropriately arranged, monitored and modified, as the case may be, to make it non-threatening and conducive. Ozoji further stressed that the place of educational or instructional technology in the education of children with special needs presupposes that provision of these technology will in themselves ensure total education of these children. According to Yakubu (2009), maintaining an overview of developments in access to technology for all areas of educational needs is a time-consuming and continuous process. It requires not only an understanding of the technology, but also an awareness of the needs of the different groups.

Although it is difficult to classify or label the varying degrees of visual impairments students have, they require certain devices to help them learn effectively in school. Students who are visually impaired, but have at least some useful vision, are often able to rely on large print materials, and specialized magnification for the assistance they need. Even those with visual problem, who traditionally have had to rely on tape recording or translations into Braille, now,

have access to many other devices that can help them become independent learners (Riel, 1990). With these text-speech applications, sometimes referred to as screen readers, students who are visually impaired can have any text found on the computer screen, read aloud. Text-to-speech technology allows students with visual impairments to participate in tasks alongside their nondisabled peers.

Another computer-based application, known as Optical Character Recognition (OCR) technology, can scan and read text aloud, allowing individuals with visual impairments greater access to all types of print materials and enabling them to read the materials independently. OCR software is now available for most computers and scanners, and other devices have been developed, making them more user-friendly. Finally, advances in computer technology have made even the use of Braille more useful (Edybum, 1991). A number of software applications have been developed that combine Braille with computer technology, such as Braille notetakers small portable devices that can store Braille characters and read text aloud to assist students with visual impairments in the classroom (Cochran, 2000). Adequate assimilation of ICT enables students to access and analyse profoundly huge volume of information in the air-waves or media than ever before. Undoubtedly ICT offers students the opportunity a flashback on their perceptions of time space. Children with autism process visual information easier than auditory information. Various types of technology from the "low" technology to the "high" technology should be incorporated into every aspect of their daily living in order to improve their functional capabilities (Cutter, 2010). The technological strategies involve "low", "mid" and "medium" technologies (Stokes, 2010). The first is a visual support strategy which does not involve any type of electronic or battery operated device. They could be low cost and easy to use equipment. Examples include-dry erase boards, clipboards, 3-ring binders, manila file folders, photo albums,

laminated pictures/photographs and highlight tapes. The second, which is mid technology, could include battery operated devices that require limited advances in technology. Examples include tape recorders, language master, overhead projectors, timer, calculators, and simple voice output devices. The third one, which is medium, could include complex technological support strategies, such as video cameras, computers, adaptive hardware and complex voice output devices. As noted earlier, visual representation of real objects is an effective strategy for children with autism. It depends on factors such as the skill being taught and the peculiar characteristics of the child with autism. It is best to start with a visual representation system of line drawings and move to a more concrete representation system of photographs or objects needed. The teacher can make use of Picture Communication Symbols (PCS) by Mayer-Johnson. These could be achieved through the use of photographs. Stokes advised that when using line drawings as in Board maker, care should be taken to determine whether to use black, white or other colours in picture communication symbols as some children with autism may prefer or dislike specific colours. They may focus on the colours instead of processing the entire picture. When any visual representation system is to be used, it should be combined with a written word, as some children with autism show a high interest in letters and words. As some are early readers, it is important for teachers to enhance the child's literacy skills by providing the written word with any type of visual representation system. In other words, teachers should make use of objects, photographs, realistic drawings, line drawings and written words (Trehin, 2010).

Teachers are one of the most critical factors if AT implementation is to be successful. They are key individuals who motivate students to use ACT (Michaels & McDermott, 2003). It is important that teachers become proactively seek training opportunities. Self-education, locally developed workshops and mentoring opportunities are avenues currently available to teachers

seeking to improve their understanding of ACT. Membership in professional organizations and communities of practice may provide additional opportunities for professional development. It is important to acknowledge that effective special education results from knowledgeable reflection and caring responsiveness to students with learning problems (Michaels & McDermott, 2003).

It may also be useful for teachers to approach AT implementation from researched approaches that have been developed and implemented elsewhere. For example, the SETT Framework (Zabala, 2006) is an easy to use format that supports AT planning. The SETT framework identifies four main areas of focus: the student, environment, task and tools. The approach is a simple yet effective means for assessment and decision making. It can support ongoing assessment. While in-service special education teachers may have had AT coursework during their undergraduate or graduate education, few workshops or professional development opportunities exist outside of coursework to continually support teachers' use of AT during instruction (Derer, Polsgrove, & Rieth, 1996; Lee & Vega, 2005; Ludlow, 2001; Michaels & McDermott, 2003). For example, in special education division of the Ghana education service, there is no system of upgrading teachers' knowledge of AT. Teachers who wish to upgrade their knowledge of AT have to depend on the local trainers in internet cafés and non-governmental organizations and institution. Even teachers who have knowledge of AT in Ghana may find it difficult to implement the knowledge in classroom due workload and non availability of the AT material. Morrison (2007) also revealed that in implementing AT in school, four implementing processes must be taken into consideration. The first phase deals with selection and planning for the use of AT. He argued that for any instructional objectives, which must be developed by AT team together with learners' parents, teacher etc, to be achieved, they must be accompanied by an appropriate AT (Morrison, 2007). In phase two the AT team previews and evaluates the

technology. In phase three, the technology is implemented through teacher and student training. In this phase, implementation, the AT team examines the curriculum to determine the way that technology can be linked to that curriculum. Questions asked here would be: how can the technology be best used to facilitate learning and what activities are best suited to the technology and the task? The final phase includes an evaluation of results to determine if major or minor changes need to be made (Cope & Ward 2002). School systems can use Edyburn's four phases to model and assess current practices, and develop policies that more closely align with the implementation process in their school districts.

A review of the educational literature on AT programs clearly emphasizes the key role of K-12 educators in the process of selecting the appropriate technology, designing programs, and implementing the AT plans on a day-to-day basis (Cope & Ward 2002). However, in one major study, in surveying 405 teachers, only 20% of the respondents believed that they had the adequate training and support in order to effectively implement AT in their particular learning environments (Derer, 1996). Related directly to this, is the observation made by Margolis and Goodman (1999) that, the type of AT training that tends to be generally offered to educators, often lacks a crucial emphasis on the pedagogical framework for its use. Instead, they claim, the emphasis is often placed on the more technical elements of the AT device or software application. Hence, the general training that is offered tends to be more focused on demonstrating how to use a specific application, and less concerned about the questions of why the AT software is being used, and how it can enhance overall learning (Barnett, 2001; Edyburn, 2004; Lonergan, 2001).

2.7 Use and Effectiveness of Assistive Technology in Educating Person with Special Needs

The role of technology cannot be understated in modern society. Christensen, Overall, and Knezek (2006) pointed out that the use of computers has evolved over the past half century from a single mainframe to individual computers to ubiquitous computing where individuals fluidly use technology throughout their daily lives. Parette, Huer, and Scherer (2004) noted that technology provides a much-needed medium to develop socialization and communication skills often lacking in students with disabilities who entered school after 2000. One of the primary characteristics of students in this period is their comfort with and consistent use of technology on a daily basis (Parette, Huer, & Scherer, 2004). The evidence suggests students with disabilities often rely more on technology than their peers without disabilities (Dwyer, 2002). Today's students have such comfort with keypads and LCDs that they often wear their technology (Dwyer, 2002). This widespread adoption of technology has transferred to a preference for using technology when learning.

A dynamic interplay exists among students, teachers, curriculum, classroom context, and technology. Marino et al. (2009) claimed that effective AT tool utilization has not yet been added to the existing curriculum in some countries. They argued that effective AT, which focuses on promoting the longitudinal viability as a means of enhancing learning, can provide pre-service teachers rich understanding on how AT can be used to create flexible learning environment for learners in school.

Technology provides enhanced opportunities for individuals to learn actively in self-directed ways, either through independent study or collaborative learning experiences (Kirschner & Erkens, 2006). Jonassen (2000) describes technology as a functioning intellectual partner that can act as a mind tool, which facilitates critical thinking and learning. Others such as Yakubu,

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(2009) have defined the scaffolds inherent in technology as cognitive tools with specific roles for the user. These tools (a) support cognitive and metacognitive processes, (b) share cognitive load by providing information as needed, thus allowing the user to concentrate on higher order thinking processes, (c) allow users to conduct activities that would not be possible in traditional classroom environments, and (d) allow users to solve problems by generating hypotheses, collecting data, and interpreting results in a simulated environment. Pre-service teachers must have the knowledge and skills to incorporate these tools in their instructional planning so that the unique needs of individuals with disabilities can be met.

Christensen et al. (2006) identified two types of tools used in educational contexts: (a) Type I tools, which allow individuals to complete every-day tasks more efficiently, and (b) Type II tools, which allow users to synthesize and communicate information in new ways. Scaffolding within these tools provides structures and frameworks that augment the learners' performance beyond what would be traditionally possible. These supports act as bridges between learning experiences and real world situations (Chen & Hung, 2004). Pre-service teachers who experience assistive technology within their technology training are able to utilize both sets of tools fluidly and identify the contexts in which each might be considered assistive technology   some students and instructional technology for others.

Flanagan, (2013) maintains that for all students technology has the potential to improve education. For students with disabilities, the potential of technology to support learning may be even greater as it has the potential to level the playing field in academic tasks (Derer, Polsgrove, & Rieth, 1996). Assistive technology (AT) may be proprietary software or created for the educational needs of students with disabilities; it may also include commonly found tools that all students use, such as instructional software and spell check (Blackhurt, 2005; Derer et al., 1996).

Assistive Technology (AT) enables all students to be successful in the general education classroom. Through the use of specialized technology such as closed circuit monitors, Braille readers, voice activated software; TTY telephones, and motorized wheelchairs, students are able to participate in educational activities that might have been difficult or impossible otherwise. Indeed, the latest amendments to the Individuals with Disabilities Education Improvement Act of 2004 (IDEIA) encourage implementation and development of technology to enhance instruction in regular classrooms. In effect, congress suggests the effective use of technology reduces and/or eliminates many of the barriers that block instruction and improves teachers' ability to better address the needs of all students. Effective teachers develop learning materials and activities commensurate with the abilities of students with special needs, much as they adapt lessons to the individual differences of all students. In doing so, they work closely with available resource teachers, specialists, and other support personnel.

Active learning theory is built on the premise that providing children with opportunities, purposefully designed by adults, to actively explore their environments will promote learning of broad range of knowledge and skills (Bausch, et al 2008).Assistive technology provides children with disabilities with equal opportunities to participate in active environments with predictive activities that are aligned to their abilities. Many assistive technology devices are available to assist teacher in improving the functional capabilities of their students via increasing students' participation in learning opportunities and involvement in activities (Scherer, 2004). The potential value of assistive technologies for enhancing learning opportunities for students with disabilities have been recognized by many countries. The federal government in the United States of America, for example, has legislation that mandates schools to provide students with

disabilities with appropriate assistive technologies (National Center for Learning Disabilities, 2007).

Although factors may hinder teachers' use of AT, other factors may actually facilitate and augment use. Teachers' use and understanding of AT may increase when effective instruction is provided during pre-service preparation or professional developments (Lee & Vega, 2005). Yet, these types of experiences are most effective when teachers learn and experience the following: how to use an AT, how to use it during instruction in a content area, how to evaluate effectiveness and the role of AT for students with disabilities (Lee & Vega, 2005). Students' positive perceptions of AT and increased learning can encourage teachers to use AT, even when not prepared adequately (Derer et al., 1996). Most importantly, teachers reported continued AT use due to students' benefiting in increased learning and independence (Derer et al., 1996; Michaels & McDermott, 2003).

Universal Design (UD) emerges with the emergence of other new trends in the field of education which emphasizes that the main objective of the educational process is empowering the learner to have a meaningful learning. Universal Design for Learning (UDL) considers differences in learners' ability and seeks to provide equal access to the information through alternate formats or modes of communication (Rose and Meyer, 2002). Burgstahler state that universal design is "the design of products and environments to be usable by all people, to the greatest extent" (2004, P.2). He also gave an example of using technology to make a building accessible to everyone by replacing a standard door with an automatically opening door (which has sensors that signal the door to open when approached by anyone including young children, elderly people, a person using a walker or wheelchair) (Burgstahler, 2004). Assistive technology

allows students with disabilities to increase their accessibility to the curriculum and the quality of learning experience

2.8 Challenges Special Education Teachers Encounter about the Use of ATs

Many agree that technology has great potential for enhancing the capabilities of individuals with disabilities (Zhang, 2000). Assistive technology (AT) can serve as a cognitive prosthesis, that is, technology that corrects impairment for individuals with disabilities (Zhang, 2000) and can help them access the general curriculum. It can also be used as a support for completing a task or learning new material (Anderson-Inman, 1999; Raskind, 1994). Nevertheless, there appear to remain a number of barriers to the successful inclusion of AT into the everyday lives of persons with disabilities. Despite the increased attention to and awareness of the potential of AT to help individuals with disabilities access the general curriculum and acquire transitional skills, as reflected in the federal legislation, several barriers remain. First, despite the existing educational technology (Zhang, 2000), accessible technology is unavailable to many students with disabilities and their families. For example, Creswell, (2002) observed that not all groups have equal access, primarily due to limited financial resources. Second, the high, costs of equipment and lack of funding to access devices or services, as well as lack of information regarding AT for families of individuals with disabilities, are often primary barriers (Wehumeyer, 1998). Third, professionals' lack of knowledge about technology can be a major obstacle. For example, few training programs for special education teachers include courses or class sessions on AT applications and issues (Zabala, 2006). Fourth, lack of ongoing support can constitute a main problem. Fifth, eligibility issues are often important obstacles, and have led to the underutilization of AT by individuals with disabilities (Wehmeyer, 1998). Additionally, even

in cases where AT was available to persons with disabilities and their families, the purchased devices were often abandoned (Todis, 1996). Major reasons for abandonment include (a) lack of -consideration of the individual with a disability and/or family's needs (Parette, 1997); **(b)** assistive technology selected for the person by family members or therapist (Scherer, 1993); (c) complicated design factors of the device regarding setup, programming, and portability (Scherer, 1993); (d) insufficient funding for the device (Todis, 1996); (e) unreliable technology (Sherer, 1993; Todis& Walker, 1993); (f) lack of technical support (Lode, 1992); and (g) equipment drawing negative attention to an individual. According to Zhang, (2012) the prospect of a technologically driven special needs education is not free from challenges. The challenges are basically in three-fold viz; the dearth of assistive technology devices in special schools, the cost of these assistive technology, and the application of assistive technology by the learner, the teacher and parents of learning disable disabled persons. There is no doubt that amongst these challenges, the most fundamental is the dearth of assistive technology in special schools and Centre's. This is because the issue of use or application would be unfounded if the assistive technology are not available in the first place. This phenomenon must not be considered in isolation but as an aspect of the low quality delivery in the Nigerian education sector.

According to Ozoji (2002) stakeholders in the education of children with special needs have not yet taken a serious view of the quality of education provided these children or how else can one explain the near total lack of basic technologies in the nation's school system for the children? He noted further that the whole question of technology needs to be revisited from the conceptual stage down to the practical aspect in order to re-engineer the technological structure to profit the children with special needs and particularly those with learning needs. Omede

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(2009) also lamented that, as useful as assistive technology proves to be, there are however, either lacking or inadequate to meet the educational need of the special needs persons.

The challenge in the dearth of assistive technology is further aggravated by the cost of these device which makes it practically difficult for the learning disabled persons most of whom are from poor economic backgrounds to purchase for personal use. Assistive technology devices like every other equipment or facility customized to meet the educational needs of special needs persons are expensive and hard to come by especially in a developing country like Nigeria. Another major challenge related to assistive technology is that of use and/or application. This issue can be viewed from the perspectives of the teacher, the learner, and parents of learning disabled children. The teachers, requires a properly knowledge of the application of these devices in order to be properly placed to teach the learning disabled children. Vexed by this issue, Ntukidem and Ashi (2009) pointed out that majority of teachers of special needs children are not computer literate: How can they teach what they do not know? In the same vein, Dala (2009) admits that "some teachers have never had the opportunity of touching or using some of the assistive technology, how can they teach or talk of about it to students?" This explains why Ozoji (2002) suggested that "one major way to redress the problem of teaching technology is to return to competency based teacher training in which specified skills in teaching the children with special needs are taught, evaluated and certificated. The technologies to use in the field should first of all be used in the training institutions because special needs educators "need to be knowledgeable in the use of the fast growing assistive technology for classroom adaptation" (Ntukidem and Ashi, 2009). Thus, the major challenges confronting the teachers summed up include limited knowledge and training on computer, effective utilization of computer and unavailability of assistive technology. Indeed, the role of the learning disabled persons in the

effective application of assistive technology cannot be over stressed especially in the areas of readiness to learn as well as the suitability of the device. Apart from problems of non-availability of assistive technology devices and technologically trained teachers in education the learning disabled persons, some of them contribute to their educational problems. In education, the interest of the learner is as paramount as the teacher's preparedness to teach. Thus, effective teaching and learning with the aids of assistive technology cannot take place effectively without the collective readiness of both. "Learning is not a spectator sport. Fundamentally, the responsibility to learn is the learner's and his alone. For learning to happen in any course, the learner must take an active role in the process" (Romack, 2006). However, the readiness of the learning disabled children to learn and apply the assistive technology can be impeded by the non-suitability of the assistive technology. That is why it is important to properly assess the nature and extent of the learning disability in order to make the right choice of assistive technology.

Another challenge identified is the poor level of appreciation of the usefulness of assistive technology by parents of learning disabled children. These parents must be taught how to apply assistive technology so that they can assist their wards at home and also be encouraged to acquire suitable technologies for their children. Several barriers inhibit more widespread use of these applications and devices, especially inadequate training and cost (Mueller, 1992). Lack of appropriate technology training in pre-service and in-service teacher programs is the most commonly in the classroom. For example, communication technologies such as e-mail and the internet represent a relatively inexpensive, yet very powerful from of instructional, technology that could be used more in instructional settings for all students, with and without learning disabilities. Lack of adequate teacher training has an especially strong impact on students with disabilities because technology is often a critical component in planning and implementation

(Graber, 2000).However, current research by Judge (2008) indicates that the training and support that are required to adopt higher tech Assistive Technolgy solutions into educational settings is not happening at the required rate given the continued reliance upon, overwhelmingly, lower tech devices; this is despite the availability of many newly developed higher tech devices and software applications.

2.9 Empirical Evidence

Zhang-Farrelly, (2011) conducted a research to examine and evaluate the service providers' perceptions about the use and need of assistive technology by people in Ireland with intellectual disability in the context of person centered service. The results found were that in Ireland, more than 85% of the people with intellectual disability are supported by voluntary organizations. As part of support services, assistive technology (AT) is often being used by service providers to promote and enhance the independence of people with intellectual disability as well as cutting care cost. Followed extensive literature review, an online survey instrument was developed to investigate service providers' perceptions about the use and need of assistive technology by people in Ireland with intellectual disability in the context of providing a person centered service. The email invitations were sent to 62 intellectual disability service providers in Ireland. A total of 50 service providers completed the online survey. In general, the results of this research shows that the majority of the service providers believed using assistive technology can promote the independence of people with intellectual disability through various aspects including living, employment, community integration, education, communication and socialization. However the lack of information about needed assistive technology for people with intellectual disability which has already been identified through previous studies has still proved to be one of

the major issues. High cost, lack of skilled professionals to make good recommendations, lack of funding are the top three barriers identified through the re-search and there are no simple solutions to overcome those barriers. The majority of the respondents agreed that Assistive Technology (AT) reutilization program, AT lending program and AT demonstration Centre could promote the usage of assistive technology by people with intellectual disability. Among those three programmes, AT demonstration center is the most important. Through this research, it has been indicated that there are still major issues for service providers in regards to receive adequate and necessary training and education about assistive technology in order to support people with intellectual disability to fully utilizing their potential ability and be socially inclusive. The use of online newsletter and information website can improve assistive technology information availability and sharing thus to increase the usage of assistive technology by people with intellectual disability. Recommendations were made on the basis of the findings from this research.

Another related study was conducted by Flanagan, Bouck, & Richardson (2013) in the U S A. In this research the authors examined middle school special education teachers' perceptions of AT during literacy instruction with students with high incidence disabilities. Results of the study indicated that although teachers used AT minimally, they perceived AT to be an effective tool for literacy. Further, the study discovered that AT was an effective literacy support when used in teaching student with high incident disabilities. However, they reported that high cost, usability and lack of experience and training were major challenges they faced when AT was used in literacy instruction. These barriers notwithstanding, the study showed that teachers' previous successful use of AT, learners' assistance in using AT during literacy instruction encouraged teachers to continue to employ AT in literacy instruction. The study suggested that

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more training in AT and teachers' consistency in using AT during literacy instruction were required for any successful utilization of AT in teaching students with high incident dishabilles.

2.10 Conceptual Framework

Based on the augment of David Wile's(2000) it stands to reason that, if external factors, such as environmental factors, tangible resources, organizational systems, incentives and tools (assistive devices) can supplement internal factors (skills, inherent ability) for effective performance, then these ideas can be transferred to classroom contexts. In figure 2 presented below, it is depicted that external (various assistive technologies) and internal factors (teacher's skills and perception) can lead us to effective use of assistive technology.
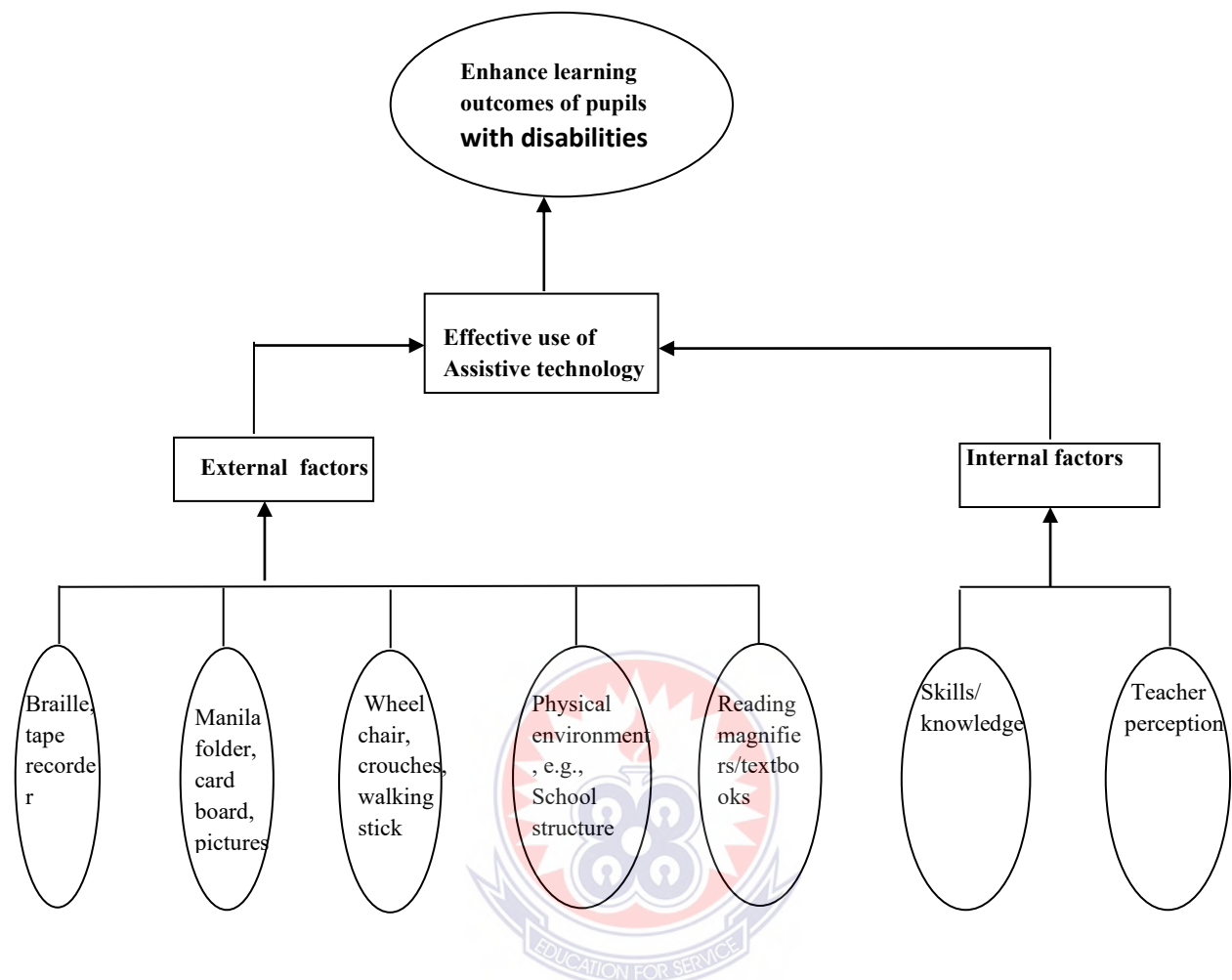
Figure 1.Enhance Learning outcomes of pupils with disabilities

The alternate aim of the study was to find out how assistive technology could be used to enhance the learning outcomes of pupils with special needs. To do this, it was postulated or proposed that, teachers' internal factors, which include their skills,/ knowledge and competency, coupled with their positive perceptions and their external factors (e.g., resources such as assistive devices) would lead to effective use of assistive technology intended to give rise to an enhanced learning outcome of pupils with disabilities. In other words, pupils' positive learning outcomes depend on teachers internal and external factors.

2.11 *GAP* (*Similarities and variations between wiles model of human performance technology and Enhance learning outcomes of pupils with disabilities model*)

The Wiles model of human performance technology (2000) and the Enhanced Learning Outcomes of Pupils with Disabilities model (empirical theory) have seven variables; 1) Organizational systems, 2) Incentives, 3) Cognitive support, 4) Tools, 5) Physical environment, 6) Skills/ knowledge, and 7) Inherent ability. The Wiles model and the empirical theory use the following seven variables: 1) manila card, 2) Braille, 3) wheel chair, 4) readers, 5) physical environment, 6) skills/knowledge, and 7) teachers` perception. These seven variables are divided into two main subgroups; internal and external factors. However, striking differences exist between the two main subgroups as, in the first place, the external factors under the Wiles model are also sub grouped as Environmental (intangibles) and Resources (tangibles) but the empirical theory stops at the external and internal only. Also, of the five external variables by the empirical theory; tools and physical environment are actually only two of the five external variables as in Wiles model (2000). Similarly, whereas, the Wiles model (2000) has skills/knowledge and inherent ability in the internal factors the empirical theory has skills/knowledge and teachers` perception.

Not all, the Wiles model of human performance technology (2000) concerns itself with the use of technology as a tool of helping in human performance but the empirical theory views assistive technology as a tool of enhancing learning outcome of persons with special needs; which concerns itself with the correction of the defect as well as assisting or helping in the teaching and learning process. Thus, assistive technology has a dual role of both corrective and assistance as against only assistance by the Wiles model of 2000. The Wiles model of 2000

looked at humans in general, but the empirical theory only concerns itself with persons with special needs.

2.1.2 Summary

This chapter has reviewed related literature of earlier studies on special education teacher's perceptions of using AT in educating persons with special needs. This review has touched on the following areas: theoretical framework, concept of assistive technology, special education teachers and their opinions on the use of AT, knowledge and skills of these teachers in handling AT, and how effectively they use AT in the classroom. In the theoretical framework, a David Wiles' "Model of Human Performance and all his seven variables affecting performance were discussed. The chapter has also discussed historical development of AT. Additionally, the chapter has dealt extensively with types of AT. On the point of teachers opinion on AT, the chapter has tried to shed some light on the misconceptions that surround AT, thereby, outlining the drawbacks and benefits of AT I the education of students with special needs.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter discusses the methods that were used to collect data for the study. It consists of the research design, the population, sample and sampling techniques, procedures for data collection, and data analysis. In addition, considerations that were taken to strengthen the validity of the study and reliability of the instrument are described.

3.1 Research Design

A descriptive design was adopted to guide this study. Descriptive study is used to obtain information concerning the current status of the phenomenon to describe "what exist" with respect to variables or conditions in a situation. The methods involved range from the survey which describes the status quo, the correlation of the study which investigates the relationship between variables to developmental studies which seek to determine changes over time (Cochran, 2000).

Gay (1992) and Amedahe (2000) viewed descriptive design as collecting data in order to test hypothesis or answer research questions concerning the current status of the subject of the study. The purpose of a descriptive design is to observe, describe and document aspects of a situation as it occurs naturally. Descriptive design involves gathering data that describe events, and then, organizes, tabulates, depicts, and describes the data collection. Description emerges following creative exploration, and serves to organize the findings in order to fit them with explanations, and then test or validate those explanations (Cooper & Schindler, 2006). Many studies call for the description of natural or man-made phenomena, such as their form, structure,

activity, and change over time, relation to other phenomena, and so on. Descriptive studies have an important role in educational research. They have contributed to increased knowledge of what happens in schools.

Against this background, the researcher examined how special education teachers perceive and use AT to train students with special needs in some schools in the Northern Region of Ghana. . The research design is appropriate for the study, because data were obtained from several people According to Ary et al. (2002), descriptive design permits the researcher to gather information from a large sample of people, relatively, quickly and inexpensively.

It was appropriate to use a descriptive design method because it is the dominant form of collecting data in education and other social sciences (Creswell, 2003). The descriptive design was further considered the most appropriate design for conducting this study, since it is the one that deals with things as they currently are (Creswell). Again, information gathered from a descriptive design can be meaningful or useful in diagnosing a situation since it involves describing, recording, analyzing and interpreting conditions that exist. Most surveys are based on samples of a specified target population of the group of persons, in whom interest is expressed. Descriptive design is designed to provide a 'snapshot of how things are at a specific time;' there is no attempt to control conditions or manipulate variables (Ary et al. 2002)

Creswell (2002) also noted that a descriptive design can be done in a short time in which investigators administer a survey to a sample or to the entire population of people in order to describe the attitudes, opinions, behaviors or characteristics of the population. Creswell, however, noted that, survey data is self-reported information, reporting only what people think rather than what they do. Descriptive design is also deemed appropriate for the study, as the current views, attitude and opinions of teachers were gathered from the respondents. The study

was, basically, aimed at gathering useful data on those conditions and variables that could not be manipulated and which would be helpful in finding out how special education teachers perceived the use of AT in educating persons with special needs in the selected special schools in the Northern Region.

3.2. Population

The target population consisted of all115 special educators in the 5 special schools selected for the study; namely, Savelegu School for the Deaf, Yumba Special School, Tamale Rehabilitation Centre, Dakpema Unit School in Tamale highlighter tape or pens, and adapted furniture, and Sugri Unit School in Walewale This population was the target group of interest for the study. According to Aryl et al. (2002), population refers to the entire group of individuals to whom the findings of the study apply. It is whatever group the investigator wishes to make inferences about.
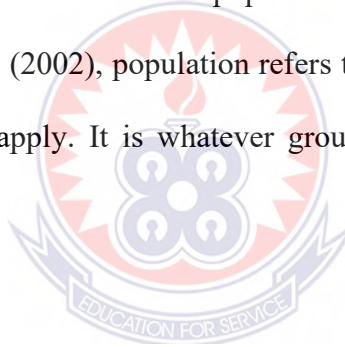
3.3 Sample

A total of 55 special educators were randomly selected from the 115 special educators in the 5 special schools for the study. The breakdown of the sample was: 15 teachers from Yumba Special School, 20 teachers from Savelegu School for the Deaf, 11 from Tamale Rehabilitation Centre, 4 from Dakpema Unit School, Tamale, and 4 from Sugri Unit School at Walewale.

3.3.1 Sampling Technique

Purposive and simple random sampling techniques were used for selecting the participants for the study. Simple random sampling was used to select the teachers because it

provides participants with equal opportunity to be randomly selected. In selecting the sample, the researcher cut several pieces of paper into equal sizes, wrote numbers on some of the pieces of paper, and folded all of them. However, the number varied from school to school because they do not all have the same number of staff members. All those who picked the first five, ten, fifteen, twenty respectively were included in the sample. In addition, a purposive sampling technique was used to select the teachers for the interview. (Creswell 2002) stated that, in purposive sampling, researchers intentionally select individuals and sites to learn or understand a phenomenon. Cohen al. (2003), cited in Avoke (2005), also asserted that purposive sampling enables researchers to handpick the case to be included in the sample on the basis of their judgment and typicality. In this way, the researcher builds up a sample that is satisfactory to specific needs.

3.4 Research Instrument

In order to gather data for the research questions, a self-constructed instrument was used. The instrument was divided into five sections. Section one aimed to capture information on the respondents' background data, such as age, marital status, and educational level. Section two was to collect data about teachers opinions of the use of AT in special schools. Questions were developed to capture data on teachers' knowledge and skills about the use of AT. Section four and Section five, were developed to study the effectiveness and the challenges teachers faced in using assistive technology, respectively..

In this study, questionnaire was the main instrument used for data collection. Best and Kahn (2006) stated that a questionnaire is a data collection technique or an instrument, which involves the preparation and use of a series of questions (both verbal and written) to gather

information on a subject from a target group. Borg (2007) asserts that a questionnaire is a data collection process where participants answer questions or respond to a statement in writing, and that a questionnaire is used when factual information is desired. The choice of questionnaire was based on its strength in allowing anonymity and privacy of respondents to be guaranteed, since no names were written on them. By using questionnaire, it was possible for the researcher to gather data from a sizeable sample drawn from a target population. The instrument was designed capturing the main issues raised in the research questions. A total of twenty (20) questionnaire items were constructed to reflect the research questions. The survey questions were cast in four sections. Section 'A' elicited background information on respondents with 5 items, while Section "B" up to section "C" comprised of twenty seven closed-ended(Strongly agree to Strongly disagree) dichotomous questions that investigated the problem. These processes were thoroughly discussed with the researcher's supervisor and subsequently approved. The instrument was later pre-tested in a school that was not part of the study. A pre-test of the instrument was conducted in a special school, not participating in the study. This was done to identify if any difficulty or ambiguities were present, and to rectify them before they were administered to participants of the study. . The pre-test involved 8 special educators in Rev. Father John Special Unit, in Winneba. Twenty closed-ended questionnaire items were administered to the special educators to solicit their views on the issues under investigation. Results from the pretesting of the instrument informed the researcher on whether the participants understood the questions they were being asked. This offered the researcher an opportunity to improve or modify the instrument. It emerged from the pretest that, some words and sentences needed clarification. The questionnaire items were developed and fine-tuned based on the outcome of the testing.

3.5 Validity and Reliability of Instrument

According to Berander (2007), validity is a tool that makes sure that the results obtained from one research work can be generalized to other research settings to achieve effective results. The main validity consideration for this study was how to make the findings statistically applicable beyond the sample and whether the instrument used really measured what it was intended to measure. This was done by collecting and critically analyzing the views of the respondents. In order to strengthen validity, the sampling procedure and the extent to which the final sample was representative of the population in the participating schools was seriously considered.

In order to ensure the reliability of data, the instrument was pre-tested in some selected schools. The aim of the pre-test was to investigate the feasibility of the questionnaire; test the research process, and the time required of the participants to respond to the questionnaire. The schools that took part in the pre-testing were excluded from the actual study. The test results were thoroughly discussed with colleagues and some lecturers at the Department of Special Education of the University of Education, Winneba. This helped in fine-tuning the questionnaire for final administration. The result of the pre-test revealed that some of the statements used in the questionnaire needed to be changed or reframed, while new statements were recommended to be included in the study. This was to ensure that the instrument captured the needed data.

In the case of reliability of the instrument, factor analysis was performed on the pilot data using Cronbach's Alpha. This was used in order to determine the level of internal consistence of the variables used. The result from the SPSS output indicates that the scale on teachers' opinions on the use of pre-test to the AT showed a reliability coefficient of 0.969 for the 15 items/variables pilot tested. The second scale, which deals with teachers' knowledge, indicated a

reliability coefficient value of 0.973, while the scale on teacher effectiveness in using AT had a Cronbach's alpha of 0.976.

3.6 Ethical Considerations

As the study involved special educators, certain ethical issues were addressed. The consideration of these issues was necessary for the purpose of ensuring the privacy as well as the security of the participants. These issues were identified in advance so as to prevent future problems that could have arisen during the study. The significant issues that were considered included consent, confidentiality and data protection. Firstly, a letter of introduction (see Appendix A) from the Department of Special Education of the University of Education, Winneba, was sent to the participating schools indicating the researcher's studentship and willingness to conduct a study in the selected schools. Before respondents took part in the study, the researcher explained his professional responsibility not to reveal the true identity of the respondents in the research report. He also explained to them that it was their right to withdraw or not to participate in the study entirely if they wished to do so at any level of the research process, though their willingness to participate could help teachers to support them to learn effectively using AT. On the part of the qualitative interview, participants were given consent forms and read everything together with the participants. This was done to ensure that participants understood every information contained in the consent form. In it, he explained the key goals and objective of the study and the researchers' professional responsibility in taking care of the information provided by the participants. Participants who took part in the qualitative interview signed the consent forms before they were allowed to participate in the study. After the study, an appreciation letter was sent to the participating schools for their co-operation and full participation (Appendix B).

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3.7.0 Procedures for Data Collection

This section involved all the processes the researcher undertook to gather data for the study. These include:

3.7.1 Access

Before the researcher collected data for the study, permission was sought from the school heads, who subsequently informed the teachers about the study in order to solicit their cooperation. Scheduled meetings were also communicated to the participants one week before each meeting time.

3.**8 Methods of Data Analysis**

There are different types of data analytical (analysis) tools in quantitative research. However, as a result of research questions dealing with the variables, univariate analysis was used, where the analysis centered on mean standard deviation for the variability's of teachers' opinion. The quantitative data were analyzed using the response from the respondents. The respondents were asked to indicate a degree of agreement and disagreement with each of a series of statement. The scale items varied from each strand as it had been sectionalized. Section "A" had 5 items, section "B"had 10 items, section "C had 6, section "D"had 6 and section "E" had 5. Each scale item had all the categories of response options ranging from strongly agree to strongly disagree.

5= strongly agree   4=Agree   3=Undecided   2= Disagree   1= strongly disagree.

In order to use the Likert-scale for interpretation, weighted means representing each question was computed. A weighted mean is the average wherein every quantity to be averaged

has a corresponding weight. These weights represent the significance of each quantity to the average. The researcher used Statistical Package for Social Sciences (SPSS) for the coding and analyzing the data from the questionnaire. The "descriptive" procedure in SPSS produced the weighted means for variables. Likert scale questions are appropriate to print means since the number that is coded can be given a feel for which direct the average answer is (University of Northern Iowa, n.d). The minimum (1) and maximum (5) indicates the range of answers given by the study respondents. Therefore, to analyze the research question one, two and three descriptive statistic was used. For research question five t test was used to analyses the collected data

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSION

4.0 Introduction

This chapter presents the analysis of data gathered from among 50 special education teachers from the 5 special education units/schools in and around the Tamale metropolis. It highlights on demographic data of the respondents, such as gender and age distributions. Other variables studied were, the teachers' opinions on the use of AT, knowledge and skills on the AT, effectiveness of the use of the AT, and challenges in the use of the AT, as well as the extent to which male and female teachers' challenges differ in the use of the AT.

4.1.0 Demographics of the Respondents

This section of the chapter presents some demographic data of the respondents. Features, such as gender, age, level of education, and the institutions/schools taught and the length of time spent in special education. Table 1 shows respondents' gender and age

4.1.1 Gender and Age Distribution of Respondents

The age and gender distributions of the respondents are presented on Table 1.

Table 1: Gender and age distribution of respondents

Table 1: Gender and age distribution of respondents

Gender of Respondents		Age of Respondents				
		Below 30 yrs	31-40 yrs	41-50 yrs	51yrs and above	Total
Male	Count	0	12	5	2	19
	% of Total	.0%	24.0%	10.0%	4.0%	38.0%
Female	Count	3	28	0	0	31
	% of Total	6.0%	56.0%	.0%	.0%	62.0%
Total	Count	3	40	5	2	50
	% of Total	6.0%	80.0%	10.0%	4.0%	100.0%

Source: Field Survey, July 2014

This study was conducted among 50 respondents and of this number, 38% were males while 62% were females. Of the male respondents, 24% were aged between 31-40 years, 10% were aged between 41-50 years, and 4% were aged above 51 years. Among the female respondents, 6% were aged below 30 years while 56% were aged between 31-40 years. The survey revealed that, there are more females than males in special education units in the in the five schools used for the study. The study further revealed that, the female special education teachers studied were more youthful than their male counterparts, since all of them were aged below 41 years while some of the male teachers were aged above 51 years. The essence of the female domination of the study is to help answer the hypothesis that, female special education teachers face more challenges in the use of AT than their male counterparts.

Table 2 below shows the academic qualification and years of teaching experience, respectively.

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4.1.2 Academic Qualifications and Length of Respondents' Experience

Table 2 Academic qualifications of teacher respondents.

Academic Qualifications		Length of Service				
		1-5 yrs	6-10 yr1	11-15 yrs	16 yrs and above	Total
Certificate 'A'	Count	4	0	0	0	4
	% of Total	8.0%	.0%	.0%	.0%	8.0%
Bed/Bsc	Count	12	20	8	0	40
	% of Total	24.0%	40.0%	16.0%	.0%	80.0%
MA	Count	0	0	2	4	6
	% of Total	.0%	.0%	4.0%	8.0%	12.0%
Total	Count	16	20	10	4	50
	% of Total	32.0%	40.0%	20.0%	8.0%	100.0%

Source: Field Survey, July 2014

Regarding the academic attainments of the special education teachers studied, 8% were holders of Certificate 'A' whilst 80% were holders of Bachelor of Education (B.Ed) Bachelor of Science in education (BSc.). About 12% of the teachers were also MA holders which suggest that, the teachers at the various special education centers in the northern region are well qualified teachers and may be very much abreast with the use of ATs in teaching children with special educational needs. With these levels of academic qualifications, 32% of the teachers have taught for a period of 1-5 years, 40% of them taught for a period of 6-10 years whilst 20% of them indicated to have taught for a period of 11-15 years. Interestingly, about 8% of the teachers with MA qualifications noted to have taught for over 16 years. The survey found that, majority of the teachers were holders of B.Ed/BSc., and majority of the teachers have taught for about 6-10 years. These periods of experience can be considered significant enough to have adequate opinion about the use of ATs. Table 2 shows data relating to the academic attainments and levels of experience of the teachers.

Figure 1 below shows the institutional distribution of the respondents

4.1.3 Institutional Distribution of Respondents

Figure 1 highlights the institutions of the respondents studied.
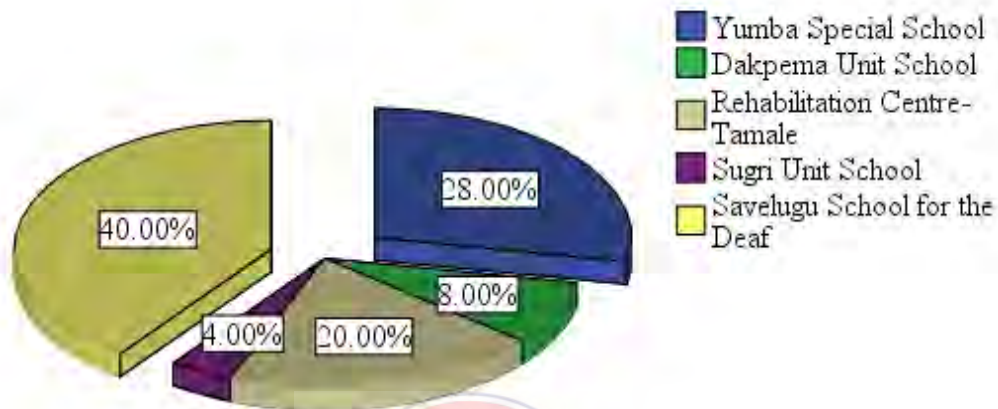
Figure3. Institutional Distribution of Respondents
Source: Field Survey, July 2014

Figure 1 above shows that, 28% of the teachers were selected from Yumba Special School whilst 8% of the teachers were from the Dakpema Unit School whilst 20% of the teachers were taken from the Rehabilitation Centre in Tamale. About 4% of the teachers were also selected from the Sugri Unit School whilst 40% of the teachers came from the Savelugu School for the Deaf. This suggests that, all the known special education schools/centers in and around the Tamale metropolis have been studied and as such, the information provided by these teachers may be very reliable regarding their faithful representation of the situation on the ground.

Table 33 shows the Cronbach's apha data used to establish the reliability or internal consistence of the variables in the statements in the table above.

Table **3. The Cronbach' s alpha of internal consistence of variables**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items		No. of Items	
.969	.980		15	
Hotelling's T-Squared	F	df1	df2	Sig
29298.094	1.514E3	14	34	.000

Source: Field Survey, July 2014

The figures of 0.969 of Cronbach Alpha and 0.980 of the Standardized Items in the above table indicate a high reliability coefficient of the statements used in the Likert scale items. A reliability test conducted using the Cronbach's alpha to determine the level of internal consistence of the variables used herein to ascertain the opinions of the respondents on the use of ATs showed a reliability coefficient of 0.969 for the fifteen items/variables used. It implies that, the data on the responses is very reliable in determining the views of teachers on the use of ATs.

4.2.0 Research Question one

4.2.1 What are special education teachers' opinions on the use of AT in teaching children with special needs?

Table 4 shows data on teachers' opinion on the use of ATs for teaching person with special needs.

Table 4.*Teachers' Opinions on the use of Assistive Technologies*

S/N	Statements	Mean	Std. Deviation
1	Assistive technology includes everything we used to support in doing things.	1.78	.88
2	The use of assistive technology is not mandated by Ghana's law.	4.54	.58
3	It is very effective incorporating assistive technology in teaching.	1.88	.84
4	Assistive technology provides special needs children with equal opportunities to participate in active classroom and environmental activities.	1.75	.56
5	I can effectively use assistive technology	1.63	.49
6	It is difficult to determine suitable devices to help special needs to be effective learners in classroom settings.	1.92	.58
7	Assistive technology is a luxury.	3.64	1.32
8	Some individuals require assistive technology throughout their entire educational careers.	1.65	.60
9	Incorporating a wide varieties of tools to satisfy the wide range of needs that student require are not necessary.	4.06	.89
10	The use of AT is time consuming and therefore must be discouraged.	4.00	.95
11	It requires not only an understanding of the technology but also an awareness of the needs of the different groups.	2.38	1.39
12	The success of the use of AT depends largely on teachers	2.50	1.46
13	I have undergone training on the use of assistive technology	3.65	1.44
14	I am not prepared to provide students with assistive technology.	2.92	1.67
15	It is the responsibilities of the government and parents to provide assistive technology to the schools and pupils with special needs.	2.08	1.40
	Total Mean Average	2.69	1.00

Source: Field Survey, July 2014

Table 4, indicated that item 2 (The use of assistive technology is not mandated by Ghana's law), 9 (Incorporating a wide varieties of tools to satisfy the wide range of needs that student require are not necessary); and 10 (The use of AT is time consuming and therefore must be discouraged.) had the highest mean score of 4.54 (SD=0.54); 4.06(SD=0.89) and 4.00(SD=0.95) respectively. This suggest that most teachers did not have knowledge of AT. The study also found a mean average of 2.7, which suggests that, majority of the statements attracted favorable responses from the respondents, however, the standard deviation of 1.0 also implies that there were responses varying from the favorable response of the teacher and are very significant to drawing any conclusions on the opinions of the teachers on the use of ATs Specifically, the statement that 'assistive technology includes everything used to support us in teaching students' received a mean response of 1.78 which implies that, majority of the teachers agreed that every other thing (gadgets, equipment, materials, software, etc.) that are used to enhance teaching and learning are referred to as assistive technologies. Responses in disagreement with the above positions were very little as depicted by the associated standard deviation of 0.88. The statement 'the use of assistive technology is not mandated by Ghana's laws' attracted a very high mean response of 4.54 which suggests that, majority of the responses were in disagreement with this statement except very few teachers who responded in affirmation to the statement. This was illustrated by the standard deviation attributable to the statement which is very little and as such, very insignificant to influence the implication that, the use of assistive technologies in teaching is mandated by the Ghanaian laws. The third statement 'it is very effective incorporating assistive technology in teaching' also attracted high level of agreement from the respondents, as shown by the mean response of 1.88 and the corresponding standard deviation of 0.84 which suggests that, disagreements to this opinion were not very

significant. The fourth statement 'assistive technologies provides special needs children with equal opportunities to participate in active classroom and environmental activities' as well attracted strong agreement from the respondents as depicted by the mean response of 1.75 and associated standard deviation of 0.56, suggesting that teachers are aware of the fact that, ATs provide children with special education needs the opportunity to participate equally in learning. The study also found very high agreements with the statement 'I can effectively use assistive technologies' as shown by the mean response of 1.63 and its associated standard deviation of 0.49 which is the least deviation obtained for the statements in this category. It implies that, majority of the teachers can effectively use assistive technologies to support their teaching skills. There were also high levels of agreement for the statement 'it is difficult to determine suitable devices to help children with special needs to be effective learners in classroom settings'. The mean response for this statement was 1.92 with its corresponding standard deviation of 0.58, which suggests that, majority of the teachers opined that, identifying devices to use in aid of supporting classroom teaching that enhance learning among children in special education is very difficult. To the statement that 'AT is a luxury', majority of the respondents disagreed with a very high response mean of 3.64 and a standard deviation of 1.32. This implies that majority of the teachers regarded AT as aids to teaching students with special needs rather than a luxury. It further suggests that, a few sessions of the teachers consider the use of AT as luxury rather than aids to teaching special children. There was a high level of agreement among the teachers regarding the statement that, 'some individuals require assistive technology throughout their entire educational careers. This was demonstrated with a mean response of 1.65 and a standard deviation of 0.60. However, the teachers also disagreed with the assertion that, 'incorporating wide varieties of tools to satisfy the wide range of needs that students require are not necessary'.

With a mean response of 4.06 and a standard deviation of 0.89, it can be held that most teachers consider it necessary to include every necessary tool in teaching special children in order to satisfy their wide range of needs in the classroom. Responses for the assertion that, 'the use of ATs is time consuming and therefore must be discouraged' was in the negative, i.e., 4.00 and a standard deviation of 0.95. That of the statement that, 'it requires not only an understanding of the technology but also an awareness of the needs of the different groups', however, attracted very high agreement among the teachers with a mean response of 2.38 and a standard deviation of 1.39 suggesting that, a good number of the teachers also responded in the negative. The assertion that, 'the success of the use of AT depends largely on the teachers' attracted moderately high level of affirmative response from the respondents with a mean response of 2.50 and a standard deviation of 1.46. This means that, a considerably good number of the teachers also disagreed with the assertion. Unfortunately, majority of the teachers have not undergone training in order to be well equipped in the use of ATs to enhance students' understanding. This was revealed by the mean response of 3.65 and a standard deviation of 1.44 which implies that, just a few teachers responded in the affirmative. However, about half of the teachers, represented with a mean response of 2.92, disagreed with the statement that, 'I am not prepared to provide students with assistive technologies'. About half of the teachers, however, were prepared to support students with ATs. It was however held among majority of the teachers that, 'it is the responsibility of the government and parents to provide assistive technology to the schools and pupils with special needs'. Nonetheless, about a third of the teachers did not subscribe to this opinion. These positions were demonstrated through the mean response of 2.08 and its corresponding standard deviation of 1.40.

Also, when special education teachers' opinions were investigated further using interviews, the study revealed that teachers indicated had positive opinions about the use of ATs in supporting pupils with special needs in school. For instance, a male teacher indicated that:

Assistive technology does not only support the individuals with special needs to cope up with their peer, but also enhance general lessons delivery. Assistive technology enables me to easily instill into my pupils the concept and for that matter the skills require them as it makes the lessons practically (teacher 1, 27 August 2014).

Likewise, another female teacher also said that:

"I think assistive technology is a good thing to adopt into our classrooms, but the teachers need to be equipped with various categories of assistive devices as well as knowledge and skills to use them. I think, knowledge about assistive technology should be brought to the teacher training college level as courses to enable all teachers have a fair knowledge about its usage (teacher 2, 28 August 2014)".

These findings buttress the point that teacher do have positive opinions about using AT to support students with disabilities to succeed in school.

Table 5 below highlights the reliability statistics in confirmation of the internal consistency of the variables used.

Table5. Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items		N of Items	
.973	.974		5	
Hotelling's T-Squared	F	df1	df2	Sig
90.187	21.166	4	46	.000

Source: Field Survey, July 2014

4.3.0. Research Question Two

4.3.1 What knowledge do special education teachers in the northern region have in assistive technology?

Table 6 below shows the responses about teachers' knowledge and skills on the use of assistive technology.

Table 6. *Teachers' Knowledge and Skills on the Use of Assistive Technologies*

S/N	Statements	Mean	Std. Deviation
1	I can identify the components of some assistive technology.	3.10	1.46
2	I can demonstrate to children with special needs on how to use some ATs	2.74	1.44
3	I can guide pupils with special needs to take care and maintain some assistive technological devices.	3.30	1.43
4	I can adopt or modify some assistive technologies for use by pupils with special needs.	2.42	1.20
5	I can improvise some low-tech devices for pupils with special needs.	2.20	1.34
	Total Mean Average	2.75	1.37

Source: Field Survey, July 2014

It was found that majority of the respondents expressed their inability to identify the components of ATs. This was represented by a mean response of 3.10 and an associated standard deviation of 1.46 which depicts that, a few teachers could identify some components of ATs. However, majority of the respondents responded in the affirmative to imply that, they can demonstrate to children when using them. That is to say, they can effectively manage assistive technologies in teaching children with special needs. This response attracted a mean of 2.74 and a related standard deviation of 1.44 which suggests that, whilst majority of teachers can

demonstrate with the AT to enhance students' learning, a few teachers could demonstrate with AT devices. Regarding teachers' skills in guiding pupils with the ATs, majority of the teachers noted that they could not guide pupils with special needs to take care and maintain some assistive technologies. However, some teachers indicated to have the ability to guide the pupils with special needs to take care and maintain some of the ATs. These findings were projected through the mean response of 3.30 and a related standard deviation of 1.43 which shows the extent to which other responses in affirmation to the argument differs from the disagreements depicted by the mean response. Related to this assessment, more than half of the respondents represented by the mean response of 2.42 noted that they can adopt or modify some assistive technologies for use by pupils with special needs. However, a few of the respondents represented by the standard deviation of 1.20 could not adopt or modify any AT device for use by pupils with special needs. Nonetheless, it is worth noting that, majority of the teachers expressed their ability to improvise some low-tech devices for pupils with special needs. This opinion was illustrated through the mean response of 2.20 and a corresponding standard deviation of 1.34 which depicts that, a few teachers could not even improvise any low-technological device to enhance the classroom understanding of pupils with special needs.

When Teacher 'A' was asked about her knowledge of AT, she stated:

> *I can effectively use cardboards to create an alternative augmentative communication device to Support individuals with communication problems to express themselves in both the classroom and outside the classroom. (Teacher 3, 29 August 2014).*

However, Teacher 'B' told a different story when he was asked also said that:

> *The term assistive technology is a new term to me. Even though I do used some devices that I think may be one of the assistive technologies. For an effective use of the assistive technology, I would need a very good orientation about assistive technology to enable understand the concept (Teacher 4, 30 August 2014).*

The reliability of the variables used in testing the consistency of the teachers' use and effectiveness of ATs in teaching children with special needs is presented on Table 7 below.

Table7. Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.976	.983	10

Source: Field Survey, July 2014

Towards assessing the use and effectiveness of ATs in enhancing special pupils' education, the study used mean and standard deviation analysis with respect to some determined variables. The Cronbach's Alpha was also used to ascertain the reliability and significance of the variables used in this assessment.

4.4.0 Research Question Three

4.4.1 What effectiveness has Assistive Technologies in educating persons with Special needs?

Table 8 below shows the results of the data collected about the effectiveness of the use of AT.

Table 8: *Use and Effectiveness of Assistive Technologies in Special Education*

S/N	Statements	Mean	Std. Deviation
1	Assistive technologies provide children with special needs with equal opportunity to participate in active classroom and environmental activities	2.04	.99
2	Children with visual problems are able to read and write through brail and the use the text their "normal" counterparts can read and write.	1.90	.95
3	Hearing aids enables hard hearing individuals to take instructions in the classroom.	1.68	.77
4	Wheelchair enables pupils with limbs problems to get access to classroom without many challenges.	1.40	.49
5	Assistive technology helps to facilitate teaching and learning in the classroom.	1.88	1.04

6	Assistive technology encourages creativity and greater problem solving in the classroom.	1.64	.60
7	Assistive technology extends teaching and learning beyond the classroom.	1.90	.95
8	Assistive technology closes the gap between special needs children and their "normal" counterparts in the educational setting.	2.30	1.11
9	Pictures and flash cards are able to capture and sustain the interest of persons with intellectual disabled in the classroom learning process.	2.20	1.34
10	Assistive technology enables the special needs to write the same exams with their non-disable peers.	1.60	.67
	Total Mean Average	1.85	0.89

Source: Field Survey, July 2014

Table 8: showed the use and effectiveness of AT in special education. The result showed item 8 (Assistive technology closes the gap between special needs children and their "normal" counterparts in the educational setting), 9 (Pictures and flash cards are able to capture and sustain the interest of persons with intellectual disabled in the classroom learning process) and 1(Assistive technologies provide children with special needs with equal opportunity to participate in active classroom and environmental activities) had highest mean scores of 2.30 (SD=1.11), 2.20 (SD=1.34)and 2.04 (SD=0.99) respectively, suggesting that most teachers in the study agreed with the statements. This implies that the teachers could have capacity to use AT effectively. Similarly, item 2 (Children with visual problems are able to read and write through brail and the use the text their "normal" counterparts can read and write); 7 (Assistive technology extends teaching and learning beyond the classroom); 5 (Assistive technology helps to facilitate teaching and learning in the classroom); 3 (Hearing aids enables hard hearing individuals to take instructions in the classroom); 6 (Assistive technology encourages creativity and greater problem solving in the classroom); and 10 (Assistive technology enables the special needs to write the same exams with their non-disable peers) had mean scores that fell between 2

(Agreed) and 3 (Uncertain), implying that although teachers might have acess to AT, they would be able to make good use of it.

For example, one of the responded stated the following during the interview session:

> *Assistive technology provides children with disabilities with equal opportunities to Participate in active classroom activities that are aligned to their abilities. Also, assistive technological devices allow children with disabilities to have easy access to school curricula and quality of learning experiences" (teacher 5, 2 September2014).*

Table 9 below shows the mean scores of male and female teachers in ascertaining which gender encounters more challenges in the use of ATs.

Table 9. Group Statistics

	Gender	N	Mean	Std. Deviation	Std. Error Mean
Challenges	Male	19	5.4737	.84119	.19298
	Female	31	13.6452	5.55907	.99844

Source: Field Survey, July 2014

The table above uses standard deviation of the mean scores to calculate the differences in challenges between male and female teachers.

4.5.0. Research Question Four

4.5.1 What Challenges do Special education Teachers' encounter when using ATs during their lessons?

The study attempted to ascertain the challenges associated with the use assistive technologies and the following are the responses gathered to that effect.

Table10. *Challenges Encountered by Special Education Teachers in the use of ATs*

S/N	Statement	Mean	Std. Deviation
1	Non-availability of some assistive technologies is obstacles to their usage in my school.	1.90	1.39
2	The cost of some assistive technologies affects their use in my school.	1.78	1.02
3	Lack of knowledge and skill is a problem for me about the use of assistive technology.	2.50	1.37
4	Lack of technical support affect the usability of assistive technology in my school.	2.32	1.20
5	The use of assistive technology is time consuming and therefore affects the way I patronize them.	2.04	1.24

Source: Field Survey, July 2014

First and foremost, the respondents held that the non-availability of some AT devices tends to be an obstacle to their usage in the schools. This position was depicted by a mean response of 1.90 among the respondents. It however attracted a standard deviation of 1.39 which suggests that, other respondents did not subscribe to this view. The study also asserted that the cost of some assistive technologies affects their use in the schools and to this assertion, majority of the respondents agreed with a mean response of 1.78 that, the cost of some technologies hinders their use by the schools. There was however a corresponding standard deviation of 1.02, suggesting that other responses differs from the above stated response. The respondents also identified that, lack of knowledge and skills on the use of ATs is another problem hindering the teachers' use of the available technologies to enhance special children' learning. This view was represented by a mean response of 2.50. However, a significant session of the respondents represented by the standard deviation of 1.37 disagrees with the assertion. It was also realized among the respondents that, there is lack of technical support which affects the usability of the available technologies in the schools. Represented by a mean response of 2.32, other respondents however disagreed with this position thereby resulting in a corresponding standard deviation of

1.20. The respondents also held that, the use AT is time consuming and therefore affects its patronage. This view was represented by a mean response of 2.04 and a standard deviation of 1.24. However, a few respondents did not consider assistive technologies as being time consuming.

The interview with the male teachers selected for the study regarding their challenges in the use of assistive technologies in teaching students with special needs revealed the challenges of non-availability of some assistive technologies, lack of knowledge on their use, lack of technical support and the high cost of some assistive technologies. But this information only seems to have been buttressing the challenges obtained with the questionnaires, and would not be necessary to repeat under a different heading. However, in an interview with the key informant 'A' regarding her challenges in acquiring knowledge on the use of technologies and their actual use in teaching students with special needs, she said:

> *"The use of technologies is time consuming and as a woman with domestic chores to render to the family, I do not have enough time to study the technologies, practice them and then apply them to teach the students."*

In the interview with female teacher 'B' on her challenges regarding the application of assistive technologies in enhancing students with special needs, she said:

> *"Due to the time consuming nature the technologies, I feel very weak to use them to teach to the students, especially during times of pregnancy and childbearing and its associated challenges of baby nursing".*
> The third female teacher also said that:

> *"My husband does not permit me to travel outside for workshops in order to gain the necessary skills and it is impossible to impact students with a skill I do not have much".*

4.6 Test of Hypothesis

The following t-test also supports the position depicted in table 10 above.

Table 11. Independent Samples Test for background variables

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig.(2-tailed)	MD	Std.E.D	95% CI L	U
Challenges	Equal v. ass.	34.585	.000	-6.338	48	.000	-8.17148	1.28924	-10.76366	-5.57930
	Equal v. not ass.			-8.036	32.208	.000	-8.17148	1.01692	-10.24234	-6.10061

Source: Field Survey, July 2014

An independent sample t-test was performed to assess (test the hypothesis) whether or not the challenges female and male special education teachers encounter in using assistive technology differed significantly. To do this, the assumption of homogeneity of variance was assessed by Leven test. The result of female male teachers' Challenges in using assistive technology, F=34.585, p = .000. This result indicated that there was no significant violation of the equal variance assumption. Therefore, the pooled variances versions of the t-test were used to interpret the results. For instance, the means of the female and male teachers challenges they encountered in using assistive technology (48) = 6.338, p = .000, two tailed.

From the result presented, it can be concluded female special education teachers have positive opinions, more knowledge and effective in using assistive technology devices than their male colleagues. Also, the fact that they use assistive technological device in teaching more than their male counterparts, they encounter more challenges than them (male teachers). This conclusion is supported by the group statistic where female special teachers' had higher mean scores of challenges (M=13.6452; SD=5.55907) than their male colleagues. From this result, we

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can therefore accept the alternative hypothesis that stated that there is significant difference between male and female teachers in the challenges they face in using assistive technology and reject the null hypothesis, which states that there is no difference between the challenges female and male special education teacher's encounter in the use of assistive technologies.

challenges were even confirmed by the views of the female teachers interviewed, especially female teachers 'A', 'B', and 'C' who respectively states that:

> *"The use of technologies is time consuming and as a woman with domestic chores to render to the family, I do not have enough time to study the technologies, practice them and then apply them to teach the students."*

> *"Due to the time consuming nature the technologies, I feel very weak to use them to teach to the students, especially during times of pregnancy and childbearing and its associated challenges of baby nursing".*

> *"My husband does not permit me to travel outside for workshops in order to gain the necessary skills and it is impossible to impact students with a skill I do not have much".*

However, it is worth saying that, females had higher mean scores because the numbers of female (No. = 31) are more than males (No. = 19).From the qualitative study, teachers were asked to comment on why female teachers encountered more problems than their male counterparts. The following data were generated.

4.7.0 Discussion of Results

4.7.1 Opinions of Special Education Teachers on the Use of Assistive Technologies

It could be affirmed from these responses that, the teachers of the five special education centers/schools studied had varying views on the use of ATs to enhance the understanding of what students with special needs learn in the classroom. Paramount among the teachers' opinions was that, some students require AT throughout their entire educational career. In addition, all the teachers in the study could effectively use assistive technologies. The responses, therefore,

confirmed the position of Flanagan et al. (2013), that, technology has the potential to improve education for all students and for students with disabilities, and that the potential of technology to support learning may be even greater as it has the potential to level the playing field in academic tasks (Derer et al., 1996). It also correlates with Flanagan et al.(2013)argument that, no one would question a student wearing a pair of glasses or getting around in a wheelchair as taking luxuries upon themselves, because these technologies are necessitated in order for people with disabilities to circumvent their disabilities and participate more freely in everyday life. Lee, and Vega (2005) also added that, certain individuals require AT throughout their entire educational careers; they are not just resources that are used sporadically as a recreational aid. AT is imperative if individuals with disabilities are to work towards independence in order to help foster a sense of autonomy. The data therefore suggested that the proposition that, 'special education teachers have positive opinions on the use of assistive technologies' is valid and must be maintained. The alternate hypothesis which held that, special education teachers have negative opinions on the use of assistive technologies does not hold and must be rejected. The data in Table 3 shows this status.

4.7.2. Teacher's knowledge and skills about the use of assistive technology

It can be held from the foregoing responses that, not all teachers in the special schools have adequate knowledge and skills on the use of assistive technologies towards enhancing pupils' understanding. A total average mean of 2.75 and its corresponding average standard deviation stands to demonstrate that about half of the teacher population for the study could use assistive technologies effectively to assist pupils with special needs whilst close to half of them could not. A test of the reliability of the variables used to assess the knowledge and skills of the

teacher using the Cronbach's reliability coefficient indicates that the variables are very reliable (i.e. 0.973). The Hoteling's T-Squared test also showed that the variables are significant in determining the knowledge and skills of the respondents. Although the findings suggest that teachers had sufficient knowledge of using assistive technology, the qualitative data extracted from the participants, who took part in this study, indicate that special education teachers had inadequate knowledge of assistive technology. These findings among the teachers also supports the argument of Lee & Vega (2005), Ludlow (2001) that, although AT offers noted advantages, teachers are often faced with the associated costs, and lack of access and training offered for both themselves and their students. Furthermore, while teachers acknowledge the potential of AT, they are also daunted by the responsibilities of understanding and using AT with their students. These findings also supports the second hypothesis that, 'special education teachers have sufficient knowledge and skills on the use of assistive technologies, and hence, it should be accepted whilst the alternate hypothesis is rejected. This suggests that if we are to succeed in our support to teach children with disabilities using assistive technology devices, many teachers need to be trained in use of assistive technology. In that way, they will be in a position to give better teachings to children with disabilities.

4.7.3 Effectiveness of the use Assistive Technologies

The teachers' on the effective use of Assistive Technology responses established that, the use of ATs is very effective in enhancing the educational needs of pupils with special needs. Regarding the variables used to assess the effectiveness of ATs among the teachers, a Cronbach's Alpha of 0.976 shows that, the variables are very reliable (consistent) in determining the effectiveness of ATs on pupils with special needs. The findings however did not differ from

the views of Flanagan et al. (2013) who maintains that for all students, technology has the potential to improve education. The importance of the effectiveness of the use assistive technologies in schools cannot be overstated. This issue was followed up using qualitative interview method. The result was not different from the quantitative data. Majority of the interviewees said that the use of assistive technology in supporting children with disabilities could enhance their learning outcomes.

From the data discussed above, it can be concluded that there is a positive relation between the use of ATs and students' understanding. That is to say, ATs enhance the learning efforts of pupils with special needs and close the gap between children with special needs and their normal counterparts.

4.7.4 Challenges Teachers encounter when using assistive technologies

The above section demonstrates that, special education teachers face challenges in the form of non-availability of assistive devices, their cost even if available, knowledge and skills of use, technical support and time availability to use them. These findings are not different from the positions of Watts, O'Brian and Wojcik (2004), Guernsey (2011), and Lin (2007) who also identified challenges of time, appropriateness of device, amongst others. Norman (1994) also identified financial challenges in the acquisition and use of assistive technologies. Table 6 below shows data gathered from the respondents in respect of the challenges encountered by special education teachers in the use of assistive technologies.

4.7.5 Discussion of the Hypothesis

From the result presented, it can be concluded that female special education teachers have positive opinions, more knowledge and effective in using assistive technology devices than their male colleagues. Also, the fact that they use assistive technological device in teaching more than their male counterparts, they encounter more challenges than them (male teachers). This conclusion is supported by the group statistic (Table 11) where female special teachers' had higher mean scores in challenges (M=13.6452; SD=5.55907) than their male colleagues. From this result, we can therefore, reject the null hypothesis in favor of the alternative hypothesis, which states that female special education teachers encounter more challenges than male special education teachers. From the result presented, it can be concluded female special education teachers have positive opinions, more knowledge and effective in using assistive technology devices than their male colleagues. Also, the fact that they use assistive technological device in teaching more than their male counterparts, they encounter more challenges than them (male teachers). This conclusion is supported by the group statistic (Table 8) where female special teachers' had higher mean scores of challenges (M=13.6452; SD=5.55907) than their male colleagues. From this result, we can therefore accept the alternative hypothesis and reject the null hypothesis, which states that there is no difference between the challenges female and male special education teachers encounter in the use of assistive technologies.

This was even confirmed by the views of the female teachers interviewed, especially female teachers 'A', 'B', and 'C' who respectively stated that:

> *"The use of technologies is time consuming and as a woman with domestic chores to render to the family, I do not have enough time to study the technologies, practice them and then apply them to teach the students."*

> *"Due to the time consuming nature the technologies, I feel very weak to use them to teach to the students, especially during times of pregnancy and childbearing and its associated challenges of baby nursing".*

"My husband does not permit me to travel outside for workshops in order to gain the necessary skills and it is impossible to impact students with a skill I do not have much".

These statements expressed by the female teachers seemed to be peculiar to them, although the male teachers also had challenges, such as lack of knowledge and skills, non-availability of some devices, high cost of technological devices, and the use of assistive technology being time consuming. However, almost all the problems pertaining to the male teachers were common to both sexes of teachers.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Introduction

This chapter summarizes the chapters of the study It specifically describes conclusions made based on the data collected and interpreted for the five research objectives, questions, and hypothesis. The chapter ends with some recommendations that could lead to improved classroom practice, as well as recommendations for future research.

5.1 Chapter Summary

In the first chapter, attention was paid to the background of the study, where statement of the research problem, purposes (objectives) for the study, research question and hypothesis were presented. The central issue for the research was to examine how special education teachers perceive and use assistive technology in some selected special schools in Northern Region-Ghana to train persons with special needs. This purpose was aimed to be achieved by four research objectives, questions and a hypothesis presented in sections 1.3.1, 1.4 and 1.5 of chapter one. Among the key issues was the hypothesis that female special education teachers have positive opinion, more knowledge, more effective and encounter more challenges in using assistive technology than male special education teachers. One of the key significance of the study was to inform future direction in the use of assistive technological devices in the field of special education. Knowing the direction was aimed to help teachers to better use assistive technologies to support and address the learning problems of the persons with special needs.

Chapter two was reserved for extensive and relevant review of literature. In doing this, both theoretical ad empirical literatures were reviewed. In particular, David Wiles (2000) theory of

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'Human Performance Technology' was effectively and appropriately reviewed and applied to this study. Wile's theory suggests that performance can be affected by seven variables: (1) organizational systems, (2) incentives, (3) cognitive support, (4) tools, (5) physical environment, (6) skills/knowledge, and (7) inherent ability. The seven variables were critically reviewed and applied in the case of teachers' use of assistive technology in special education field in the northern region of Ghana.

To gather data for the study, mixed research methodology, presented in chapter three, was employed. Mixed method was deemed appropriate as the research questions could thoroughly be investigated using both quantitative and qualitative data. This was considered as one of the strengths of the study. Survey questionnaire, consisting four scales of Likert Scales type were constructed to solicit information about teachers' opinion, knowledge, effectiveness in using assistive technology and challenges teachers encounter in using assistive technology. Consent forms were signed by the participants and it took two to three weeks for teachers to return the filled questionnaire. The qualitative data were extracted after the quantitative data were analyzed.

Data were analyzed using descriptive design, t-test and qualitative data analytical procedures. In chapter four, the collected data were screened, analyzed and presented according to the research objectives, questions and hypothesis.

5.2 Conclusions

The conclusions from the study were presented according to the research objectives, questions and hypothesis. For the research objective one (question and hypothesis one) was aimed finding out special education teachers' opinions on the use of assistive technologies in

teaching special needs children. The conclusion is that 'special education teachers have positive opinions on the use of AT since most of the statements had high mean scores.

The research question two was intended to examine the level of teachers' knowledge of AT. From the resulted presented in chapter four, it concluded that not all teachers in the special schools have adequate knowledge and skills on the use of AT towards enhancing pupils' understanding. Although teachers had insufficient knowledge of assistive technology, female teachers' knowledge level in assistive technology (AT) is higher than that of their male counterparts. Also, research question three sought to investigate teachers' opinions about the effectiveness of using assistive technology in educating persons with special needs. From the analysis presented, it can be said that AT are effective in supporting children with special needs in schools in the northern region of Ghana. Furthermore, research question four (What challenges do special education teachers encounter when using assistive technology during their lessons?) Sought to discover challenges special education teachers encounter in using assistive technology in school. The conclusion from the data presented above is that special education teachers face serious challenges in accessing some assistive technologies devices; paying for high cost of some Assistive technology devices; they lack of knowledge of some assistive technology devices; and that they are challenged with the limited to use some assistive technology devices(use of AT is time consuming).

Finally, the research hypothesis that, 'there is significant differences between female and male special education teachers' challenges encountered in using assistive technology' was aimed at finding out gender differences in terms of challenges. The data revealed that female special education teachers had more challenges in using assistive technology than their male

colleagues. Therefore, the alternative hypothesis can be accepted while the null hypothesis is rejected.

5.3. Recommendations

To address the problem of non-availability of some assistive technologies which currently makes it difficult to effectively teach children with special needs in the Northern Region. The study suggests that the government and for that matter the ministry of education and Ghana education Service as well as the Special Education Division should collaborate to support the special schools in the northern region to acquire some assistive technologies, such as laptops, projectors, hearing aids, wheelchairs, Braille by supplying the schools or subsidizing the prices of those technologies for parents and the teachers.

Again, in terms of repairs, the government of Ghana can help train a set of interested individuals who will readily assist the teachers in maintaining and repairing their devices instead of dumping them upon their breakdown. A collaborative effort could also be directed towards forging mutual grounds with sister countries who are far advanced in these areas, so that impacts of their advanced status could be felt in our deprived areas.

Fresh courses on the acquisition and use of assistive technologies should also be introduced into the school curriculum for special education teachers to possess these skills and abilities before being posted to the classroom. This will help equip special education teachers with the necessary information to be delivered in the classroom.

Towards improving the awareness of teachers on the need to employ assistive technologies to enhance teaching in the special schools/centers, the study suggests that sensitization programmers and lectures should be organized periodically to create and update teachers' awareness on existing and new technologies that can aid in the classroom for teaching pupils

with special need. Further, this kind of training should be decentralized so as to enable even the unprivileged teacher in the village to also access this programme for improving his/her skills. This would help teachers, especially, female teachers to also participate in such workshops and enhance their skills and knowledge while still attending to their traditional roles to their families.

Finally, the study suggests that, a special monitoring team should be deployed to regularly monitor and redirect the use of assistive technologies in the classrooms to assist children with special education. On teachers' knowledge of AT, the study suggests that appropriate workshops and mentorship appropriately should be provided for teachers. On the effectiveness of AT, the chapter has argued that the only way to provide learning is to create opportunities for special needs children to explore their environment. The chapter also touched on the challenges teachers of special education face. It looked at it in three folds. Regarding the empirical evidence, the chapter mentioned that 85% of the people with intellectual disabilities are by voluntary organizations. Also, in the conceptual framework, I have opined that both external and internal factors can lead to effective use of assistive technology. These has set the ball rolling for the researcher to examine special education teachers perception of using assistive technology taking into cognizant the variables of this topic. Finally, the chapter looks at the Gap between the Wiles model of 2000 and the empirical theory of learning outcome using the assistive technology.

5.4 Suggestion for Further Studies

Having assessed the perceptions of special education teachers on the use of assistive technologies to enhance the effective teaching of pupils with special needs in some selected special schools in the Northern Region, future research directions may include replicating this

study to have a larger response rate to better generalize findings. Based upon the findings it is suggested that the contextual scope and geographical boundaries of the study should be broadened to cover a nationwide phenomenon. It is also suggested that, further studies should be carried out in terms of assessing the role of motivation in enhancing special education teachers' use of assistive technologies. Future research should address if teachers' reported use actually correlates to their classroom practice (i.e., if a teacher reported having little access to AT but actually has multiple classroom computers and an available AT expert for support). For example, a study could have teachers respond to the survey used in this research or a similar one, and then observe the teacher using AT, analyze the available resources, and interview the teacher for more in-depth information. Last, future research exists in integrating experiences in to pre-service teachers AT or methods coursework. Then, examining how perceptions of AT change and how AT is actually used in later field experiences or as an in-service teacher.
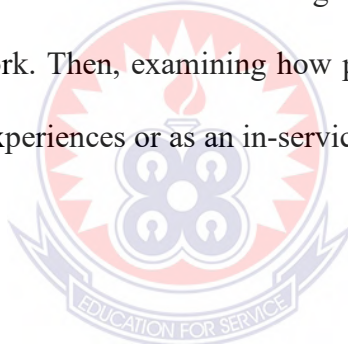
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APPENDIX A

(QUESTIONNAIRE FOR SPECIAL EDUCATORS)

SPECIAL EDUCATION TEACHERS' PERCEPTIONS OF USING ASSISTIVE TECHNOLOGY IN EDUCATING PUPILS WITH SPECIAL NEEDS IN NORTERN REGION GHANA

INTRODUCTION

I am student pursuing Master of Education in Special Education at the University of Education Winneba (UEW) This questionnaire is being administered to select participants to solicit information on the above mentioned study. I would be very grateful if you respond to all the questions providing as much details as required and return the questionnaire as soon as possible. The answers given will be used for academic purposes only.

Please be assured that information provided will be treated with absolute confidentiality.

Many thanks for your cooperation.

Section A: Background information

Instruction: Please, tick the response which corresponds with your background information.

1. Gender   male ( )   female ( )

2. Age:a)Under 30years ( ), b) 31-40 years ( ), c) 41-50 years ( ), d) 51years and above( )

3. What is your current academic or professional qualification?

   a) Diploma ( ), b) BA/BSc ( ), c) MA ( ), d) M.Phil. ( ), e) PhD ( ),

   f) Others, please specify……………………………………………………………….

4. How long you have been working with your institution?

   a) 1-5 years ( ), b) 6-10 years ( ), c) 11-15 years ( ), d) Over 15 years ( )

5. How long have you been in your current position? A) 1-3 years ( ), b) 4-6 years ( ), c) 7-8 years ( ), d) 9-10 years ( ), e) Over 10 years ( )

Instructions: Below is a table to be completed. It involves statements about your opinions of the use of assistive technologies in educating special needs.

KEY: S 5= Strong Agree(SA), 4= Agree(A), 3= Uncertain(U), 2= Disagree(D), 1= Strongly Disagree(SD)

 AT= Assistive Technology, SEN= Special Educational Needs.

Section B: opinions of Special education teachers

KEY: S 5= Strong Agree(SA), 4= Agree(A), 3= Uncertain(U), 2= Disagree(D), 1= Strongly Disagree(SD)

SN	STATEMENT	5=SA	4=A	3=U	2=D	1=SD
6	The use of assistive technology is not mandated by the law of Ghana					
7	Incorporating a wide variety of tools in order to satisfy the wide range of needs that students require is not necessary					
8	The use of AT is time consuming and therefore must be discouraged					
9	success is dependent not only on having access to a device, but also on factors involving the selection, acquisition, and the use of the tool					
10	Assistive technology is a luxury					

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11	Assistive technology is very helpful in lesson delivery					
12	I can effectively use assistive technology					
13	Certain Individuals require assistive technologies throughout their entire educational careers					
14	Government, District Assemblies and Parents should provide AT					
15	The success of AT use greatly lies on teachers perceptions					

Section C: Special education teachers' knowledge and skills about the use of assistive technology.

KEY: S 5= Strong Agree(SA), 4= Agree(A), 3= Uncertain(U), 2= Disagree(D), 1= Strongly Disagree(SD)

SN	STATEMENTS	5=SA	4=A	3=U	2=D	1=SD
16	I am not prepared to provide students with AT					
17	I have gotten three courses about the use of AT					
18	It is easy to use AT					
19	It requires not only an understanding of the technology but also an awareness of the needs of the different groups.					
20	It is difficult to classify or label the varying degrees of persons with disabilities and determine a suitable					

SN	STATEMENT					
	device to help them be effective learners in classroom settings.					
21	care should be taken to determine whether to use black, white or other colours in picture communication					

Section D: Use and effectiveness of assistive technology in educating person with special needs.

KEY: S 5= Strong Agree(SA), 4= Agree(A), 3= Uncertain(U), 2= Disagree(D), 1= Strongly Disagree(SD)

SN	STATEMENT	5=SA	4=A	3=U	2=D	1=SD
22	Assistive technologies provide children with disabilities with equal opportunities to participate in active classroom and environmental activities.					
23	Technology has the potential to improve education					
24	Students' positive perceptions of AT and increased learning can encourage teachers to use AT, even when not prepared adequately					
25	AT encourages creativity and greater problem solving as the student's energy is put into creative aspect of their work.					
26	AT extends teaching and learning beyond the boundaries of the classroom					
27	AT is not user friendly					

Section E: Challenges special education teachers encounter about the use of assistive technology.

KEY: S 5= Strong Agree(SA), 4= Agree(A), 3= Uncertain(U),   2= Disagree(D), 1= Strongly Disagree(SD)

SN	STATEMENT	5=SA	4=A	3=U	2=D	1=SD
28	ATs come with very high costs					
29	I have no knowledge of how to use the product or what it is for					
30	The use of AT is time consuming					
31	The high-tech devices are difficult to come by					
32	The use of AT requires a lot of skills and efforts					

Thank you. And may God richly bless you
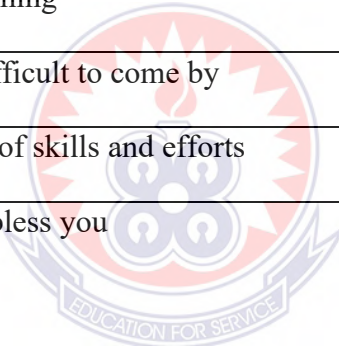
APPENDIX B

(INTERVIEW GUIDE)

UNIVERSITY OF EDUCATION, WINNEBA

SPECIAL EDUCATION TEACHERS PERCEPTIONS OF USING ASSISTIVE

TECHNOLOGY IN EDUCATING STUDENTS WITH SPECIAL NEEDS IN THE

NORTHERN REGION

1. What is your opinion regarding the use of assistive technologies in teaching children with special needs?

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....How well can you use some identifiable assistive technologies in teaching pupils with special needs?

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....What impacts/effects do assistive technologies have on the teaching and learning of pupils with special needs?

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………………………………………………………………………………What are your challenges in acquiring and using skills in assistive technologies for students with special needs?

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APPENDIX C

(AUTHORIZATION LETTERS)

DEPARTMENT OF SPECIAL EDUCATION
UNIVERSITY OF EDUCATION, WINNEBA (UEW)

July 25, 2014

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Dear Sir/Madam,

LETTER OF INTRODUCTION

I write to introduce to you Alhasssan Zakaria a master's student at the Department of Special Education of the University of Education, Winneba.

He is currently working on the topic: "**Special Education Teachers Perception of using Assitive Technology in Education Pupils with Special Needs in the Northern Region of Ghana**", for his dissertation.

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

Thank you for your time and cooperation.

Yours faithfully, HEAD
DEPARTMENT OF SPECIAL EDUCATION
UNIVERSITY OF EDUCATION
P. O. Box 25, WINNEBA
SAMUEL HATFORD (PhD)
Ag. HEAD OF DEPARTMENT