

**IMPACT OF ASSISTIVE TECHNOLOGY INTERVENTION ON VISUALLY
IMPAIRED STUDENTS' PERFORMANCE IN KISWAHILI IN PUBLIC
PRIMARY TEACHERS' COLLEGES IN KENYA**

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A thesis Submitted in fulfilment of the Requirements for the Award of the degree
of Doctor of Philosophy in the Department of Educational Communication and
Technology of the University of Nairobi.

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DECLARATION

This thesis is my original work and has not been presented in any other university for a degree or any other award.



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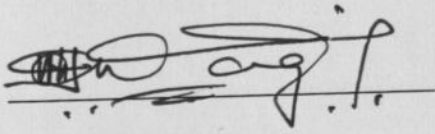
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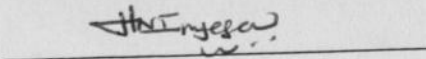
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DEDICATION

To dad and mum whose sacrifice for my education inculcated in me a spirit of determination and quest for more knowledge. Special dedication goes to Edward Limo for his spiritual nourishment and material support. Thank you.

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LIST OF ABBREVIATIONS

AT	Assistive Technology
CHAKITA	Chama cha Kiswahili cha Taifa
DRC	Democratic Republic of Congo
ESL	English as a Second Language
KIE	Kenya institute of Education
KISE	Kenya Institute of Special Education
KNEC	Kenya National Examinations Council
MLE	Mediated Learning Experience
MOE	Ministry of Education
OCR	Optical Character Recognition
PTE	Primary teacher Education
SPSS	Statistical Package for Social Sciences
TATs	Teacher Assistance Teams
TCs	Teachers' Colleges
UNESCO	United Nations, Educational Scientific and Cultural Organization
UK	United Kingdom
UN	United Nations
USA	United States of America
VI	Visually Impaired
VSC	Variable Speech Control

ABSTRACT

The right to education is universal to all including those with disabilities. Students with visual impairments can struggle with a wide variety of challenges in a mainstreamed classroom setting. AT intervention by use of assistive devices in teaching, use of assistive teaching methods, taking care of VI severity and boosting positively the student-teacher related factors improve their performance. The purpose of the study was to examine the impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary TCs in Kenya. The specific objectives were; to determine the impact of assistive technology device in teaching VI students and their performance in Kiswahili; impact of use of AT on students' severity; relationship between use of assistive technology on student-teacher related factors as well as establishing the relationship between use of assistive teaching methods and performance of VI students in Kiswahili in Public Primary Teachers' Colleges in Kenya. The study adopted quasi experimental design by use of a pre test and post test. It was appropriate to analyse the treatment effect of using AT in teaching VI students in one group while applying the natural teaching methods on the control group. The target population comprised of three teachers' college in Kenya (Asumbi, Machakos and Mosoriot), that deals with students with visual impairment. The findings show that the Braille prints were available and adequate. The AT devices were critical in teaching VI students in order to improve their performance in Kiswahili and therefore their adequacy in college determined the rate of students' performance. The study found out that the attitude of the Kiswahili teachers in teaching VI students was positive but the challenges in ensuring quality teaching of Kiswahili Language included the students having a negative attitude towards languages, teachers have a negative attitude towards their career and lack of adequate teaching and learning materials. The study found out that the most significant methods that the teachers used to teach Kiswahili Language to students with VI were: lectures, assignments and group discussions. From the findings, there is a significant relationship between AT device in teaching and performance in Kiswahili, with an associated P value = .019. In addition, there is a significant relationship between AT on VI students' severity and performance in Kiswahili with t-test statistic with an associated P value = 0.00. There is a significant relationship between use of AT on student- teacher related factors and the performance of VI students in Kiswahili with an associated P value = .000. The study concluded that while using the natural teaching methods, most of the totally blind students had a slight increase in performance while majority of the partially blind students had high increase in performance. The findings inferred that the partially blind students were better suited for the natural teaching methods than the totally blind students as they performed higher when taught using natural teaching methods. The study recommends that the management of tertiary institutions should invest on interventions like the assistive technology in enhancing their academic performance. The study further recommends that other strategies for teaching VI students like use of peer consultations between the VI students with sighted students, use of quieter rooms, teacher assistance teams; extended exam time for VI students and shorter assignments to the VI students should also be employed to enhance Kiswahili Language to students with visual impairment. The significance of the study is that AT device intervention such as use of digital recorder in teaching can improve students' academic performance.

CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

The right to education is universal to all including those with disabilities. This right is envisaged in the Convention of Rights of the Students (2007) and the Convention on the Rights of Students with Disabilities (2008). The right to education to all children is also addressed in several significant international declarations, including the World Declaration for Education for All (1990), the UNESCO Salamanca Statement and Framework for Action (2007) as well as the Dakar Framework for Action (2000). Visually impaired (VI) students have a right to access quality education that enables them to perform well in examinations.

Visual impairment is either total blindness or low vision. It refers to a significant loss of vision, even though the person may wear corrective lenses. Being visually impaired is defined as “loss of sight that affects a student’s educational achievement in a negative way and which cannot be recovered” (Demir & Sen, 2009). The development of a student with a visual impairment is affected by: the type and severity of the visual impairment; the onset of the visual impairment; the nature and degree of intervention; the availability of equipment and resources; the presence of other disabilities; and cultural attitudes to visual impairment. A low vision student may be able to read large print while a totally blind one can use Braille prints to read. The nature and degree of visual impairment may vary significantly; so, each student may require individual adaptations to instructional practices and materials in order to learn effectively. The performance of VI students in academics is

dependent on the teaching methodology used in school (Alonzo, 2006). Assistive technology (AT) is the use of assistive devices in teaching, assisting the VI students according to their severity, assisting in boosting positively the student-teacher related factors and use of assistive teaching methods to improve their academic performance.

Globally, the challenge for educators of VI students, including those with other disabilities, is how to teach skills that sighted children typically acquire through vision. VI students have used a variety of methods to learn to read, write, and acquire other skills, both academic and non-academic (Cole & Chan, 2000). VI students use a combination of AT devices including Braille, large print, low vision aids and audio devices in learning.

The federal definition of assistive technology in US used in IDEIA is “any item, piece of equipment or product system, whether acquired commercially or off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities” [IDEIA 2004]. The IDEIA 2004 also defined AT services as any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device. On a practical level, these mandates require that teachers, particularly special educators, must a) be aware of available technologies, b) select devices or programs that can increase the performance and functioning of their students, c) assist students with using technologies and evaluating their effectiveness in instructional environments, d) effectively integrate technologies into instruction to ensure improved learner performance, and e) collaborate with related service providers, parents, and/or

technology specialists on AT decisions. Although these mandates have been in place for several years, preparing future teachers to use AT in classroom settings continues to be a challenge.

Results from two national surveys conducted within the last ten years in France substantiated inadequate AT preparation among special education teacher candidates. Michaels and McDermott (2003) surveyed coordinators of graduate special education teacher education programs across a sample of institutions of higher education with graduate special education certification programs. These authors measured how programs integrated AT knowledge, skills, and dispositions into graduate educational programs and determined how coordinators would ideally like to have AT integrated within their programs. More recently, Judge and Simms (2009) surveyed institutions of higher education with special education teacher preparation programs to determine how AT was addressed in coursework in Belgium. Results revealed that approximately one third of undergraduate programs and less than one quarter of master's degree programs required AT coursework. This suggests that many special educators enter the field without adequate AT knowledge and skills.

Many other countries such as South Africa, Tanzania, Uganda, Nigeria and Kenya, appreciate that all persons have a right to quality education, and thus are implementing inclusive education(Ndurumo,1993).Quality education should yield good student performance in examination, and therefore it is research concern when students perform below expectations (Joyce,Weil,Calhome, 2004).

Ndurumo (1993) reported that the majority of students with disabilities in developing countries including Kenya are either currently out of college or they perform poorly. Many of those enrolled are not given the special attention they deserve. Therefore, removing barriers to accessing education for students with disabilities is a pre-requisite for the realization of Universal Primary Education and Education for All (Burk, 1998). In order to achieve this, it is important to ensure that all students have access to quality education; education policies and practices must be inclusive of all learners, encourage the full participation of all in the society at large (Ngugi, 2003; Sessional Paper, 2005; Elliot & Kratochwill, 2000). While the lack of skills may be due to various factors such as disability, inadequate instruction, and lack of opportunity or motivation, teachers are faced with the challenge of providing content information to all students who struggle with reading. One strategy for addressing this challenge is the use of AT (Schug, 1997; William, 1998). AT are adaptive and rehabilitative devices and methods for people with disabilities and who have difficulties in performing tasks for example the VI students who have difficulties in reading.

Kiswahili is a key subject in career development, hence compulsory in the Kenyan secondary schools and colleges' curriculum. Studies have shown that performance of students with disabilities in national examinations in Kenya has generally been poor. Performance of VI students in Kiswahili in Primary Teacher Education (PTE) examination has been poorer compared to other subjects. The latest statistics for the

performance of VI students in Kiswahili as provided by the Kenya National Examinations council (KNEC).

Table 1: Statistics for the performance of VI students in Kiswahili

College	Period		
	2009	2010	2011
Asumbi	VI: 7; 2 Failed	VI: 4; 2 Failed	VI: 7; 5 Failed
Mosoriot	VI: 6; 3 Failed	VI: 10; 5 Failed	VI: 12; 4 Failed
Machakos	VI: 4; 2 Failed	VI: 22; 6 Failed	VI: 10; 4 Failed

Note: VI = Visual Impaired Source: Kenya National Examination Council, (2012)

Evidence on why VI students have continued to perform poorly in Kiswahili in PTE examination has not been shown. While there are 18 public primary Teachers' Colleges (TCs) in Kenya, only three (Asumbi, Mosoriot and Machakos Teachers' Colleges) admit students with visual impairment and offer them inclusive education. According to the Ministry of Education (MOE) 2011, VI students who did their PTE Examination in all the three colleges were 29 (Asumbi 7, Mosoriot 12 and Machakos 10).13 of the VI students who did their PTE examination in 2011 failed. The VI Students did not perform well in the Kiswahili language as none got quality grades; that is, a distinction 1 or 2 or even a strong credit grade but got low quality grades. The three colleges admit an average of 500 students per year. In 2011, a total of 5 students from Asumbi, 4 from Mosoriot and 4 students from Machakos teachers' college failed. This study used AT (assistive device in teaching,

assistive methods in solving student –teacher related factors and assist different VI categories according to their severity) as a way of intervention to boost the performance in Kiswahili. VI students can benefit from recorded information by use of a digital recorder. In this study the researcher used AT in teaching the VI students to boost performance.

1.2 Statement of the Problem

Academic performance of VI students is a subject that has been widely studied. Empirical research shows that availability of teaching and learning materials (Ayot & Patel, 1997), teaching methods (Joyce et al., 2004), student and teacher-related factors and severity of impairment (Van Bon, 2004) have been mentioned to have an influence on the performance of students in subjects such as Foreign languages, Mathematics and Science. In the classroom, students with disabilities face more challenges than their non-disabled peers. For example, students with Attention Deficit Hyperactivity Disorder (ADHD) encounter disciplinary problems, underachievement, poor grades, or inability to complete assignments (DuPaul & Stoner, 2003; Reid, Trout, & Schartz, 2005). Students labeled as emotionally and/or behaviorally disordered (EBD) are more likely to be academically deficit in multiple areas including reading, mathematics, and writing (Mooney, Ryan, Uhing, Reid, & Epstein, 2005).

However, a study has not been done showing the intervention of the visually impaired students' poor performance. In 2011, students with visual impairment formed 2% of the total students' population in the 3 colleges offering inclusive education in Kenya. Kiswahili performance has been an area of concern in the

Kenyan Education system for several decades (Republic of Kenya, 2008). Students with visual impairments can struggle with a wide variety of challenges in a mainstreamed classroom setting. While these students can hear instructions and follow class discussion, they might easily miss material that is presented visually in text including overhead projections or demonstrations. VI Students generally fall into two categories (totally and partially blind) requiring different teaching techniques. VI students require teaching techniques to accommodate their vision loss; for example, teachers can use handouts in Braille or large print (Hall, 2000; and KISE, 1995). While studies have demonstrated the value of AT in many situations ;Hasselbring & Bausch, 2006; Derer, Polsgrove & Reith, 1996; Parker, Buckley, Truesdell, Riggio, Collins & Bordman, 1990, the implementation of these tools as an intervention for the VI students has not been done in teachers' colleges. A good performance in Kiswahili for the teacher trainees in TCs is mandatory in order for them to use the learnt skills while teaching in the field. The use of AT tools to assist VI students who still struggle with reading is even less common. AT intervention by use of assistive devices in teaching, use of assistive teaching methods, taking care of VI severity and boosting positively the student-teacher related factors improve their performance.

1.3 The Purpose of the Study

The purpose of the study was to examine the impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary TCs in Kenya. The AT device used in the study was digital recorder.

1.4 Research Objectives

The specific objectives guiding the study were: -

- i. To determine the impact of assistive technology device on teaching VI students and their performance in Kiswahili in Public Primary Teachers' Colleges.
- ii. To establish the impact of use of assistive technology on VI students' severity and their performance in Kiswahili in Public Primary Teachers' Colleges in Kenya
- iii. To determine the relationship between use of assistive technology on student-teacher related factors and performance of VI students in Kiswahili in Public Primary Teachers' Colleges in Kenya.
- iv. To establish the relationship between use of assistive teaching methods and performance of VI students in Kiswahili in Public Primary Teachers' Colleges in Kenya.

1.5 Research Hypotheses

In order to investigate the problem of this study, the following research hypotheses were tested:

- H₀₁ There was no significant relationship between use of assistive technology device in teaching VI students and their performance in Kiswahili in Public Primary Teachers' Colleges in Kenya.
- H₀₂ There was no significant relationship between use of assistive technology on VI students' severity and their performance in Kiswahili in Public Primary Teachers Colleges.

H₀₃ There was no significant relationship between use of assistive technology on student- teacher related factors and performance of VI students in Kiswahili in Public Primary Teachers' Colleges in Kenya.

H₀₄ There was no significant relationship between use of assistive teaching methods and performance of VI students in Kiswahili language in Public Primary Teachers' Colleges.

1.6 Significance of the Study

The results of this study will add more information to the present literature on performance of Kiswahili Language of students with visual impairment in the Primary Teachers' College (TCs) in Kenya. The findings of this study will be of immediate benefit to Kenya Institute of Education in formulation of a syllabus to in-service teachers on the use of assistive technology intervention in teaching VI students. The use of assistive technology will enhance performance in Kiswahili. The results of this study will help teachers to sharpen the strategies they use to teach students with visual impairment at the (TCs) and the use of assistive technology in teaching the students.

1.7 Limitations of the Study

This study was limited to teaching experience and teacher's competency, student's and teacher's attitudes. Extraneous variable like college capability and Government policies also limited the study. The teachers with long teaching experiences may be found to be more conversant with strategies on teaching of the students with visual impairment compared to their counterparts who were employed recently. Another limitation of the study was related to sample size. The effect of these variables was

minimized during the sampling procedure where all respondents with desired characteristics were sampled for the study.

1.8 Assumptions of the Study

This study was guided by several assumptions. First, it was assumed that age of the students and their gender would not affect performance. It was also assumed that teachers teaching experience affects performance. It was also assumed that use of AT affects performance positively and lack of it curtails performance.

1.9 Delimitation (Scope) of the Study

The study was confined to three teachers' college in Kenya (Asumbi, Machakos and Mosoriot), that deals with students with visual impairment. Asumbi is situated in Homabay; Mosoriot is in Uasin Gishu, while Machakos is in Machakos County. The accessible population comprised of the principals, teachers and students with visual impairment in the three colleges.

1.10 Definition of Terms

Assistive Technology (AT): “any item, piece of equipment or product system, whether acquired commercially or off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities”. AT includes use of assistive device (digital recorder), assistive teaching methods in regard to students’ severity.

Quality Grades: These are; Distinction (1 and 2 points), Credit (3, 4 and 5 points; average performance). A pass is (6 and 7 points) and a fail (8 points).

Low Vision: Is a term used to describe a degree of severity of visual loss. Individuals with low vision have reduced vision even when using the best possible spectacle or contact lens correction is applied.

Inclusive Education: Inclusive education implicitly means to identify a student’s learning style and adapt the classroom and teaching strategies to ensure high quality learning outcomes for all students of the class.

Impairment: Refers to any temporary or permanent loss or abnormality of a body structure or function, whether physiological or psychological. Impairment affects body functions.

Student: This is a person engaged in study; one who is devoted to learning; a learner; a pupil; a scholar; especially, one who attends a school, or seeks knowledge from teachers or from books.

Visually impaired: Is the “loss of sight that affects a student’s educational achievement in a negative way and which cannot be recovered

Performance: Is how well or badly you do something especially in academics; it is an act that involves a lot of effort or trouble.

1:11 Organization of the Study

The study is organized into five chapters. Chapter one entails background of the study, statement of the problem, the purpose of the study, research objectives and hypothesis, significance of the study, limitation of the study and assumptions of the study. Chapter two reviews literature on AT, severity of VI students, teaching and learning materials for VI students, student- teacher related factors in teaching and learning of VI students, teaching methods and strategies, theories guiding the study and conceptual frame work. In Chapter three research methodology entails the research design, target population, the sample size and sampling procedures, research instruments, validity and reliability of research instruments, data collection procedures and data analysis. Interpretation, presentation of data and discussions of findings is done on chapter four. Chapter five deals with summary, conclusion and recommendations for futher research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter contains comprehensive literature review drawn from theory and past studies related to the determinants of teaching students with visual impairments and performance of visual impaired students in the Kiswahili Language. The literature review is divided into four main areas according to the research objectives namely ;use of assistive device, severity of visual impairment and the performance of Kiswahili language, student-teacher related factors and the methods used to teach students with visual impairment and their performance.

2.2 Assistive Technology (AT)

Assistive Technology (AT) is any item, piece of equipment, or system, whether acquired commercially, modified, or customized, that is commonly used to increase, maintain, or improve functional capabilities of individuals with disabilities, The National Centre on Accessible Information Technology in Education, 2008. While the definition of assistive technology emphasizes its use with individuals with disabilities, AT can provide support for students who struggle with reading regardless of the cause. Studies have found positive outcomes associated with the use of assistive technology for students with reading deficits (Balajthy; 2004, Boyle, Rosenberg, Connelly, Washburn, Brinckerhoff, & Banerjee, 2003; Kim, Vaughn, Klinger, Woodruff, Reutebuch, & Kouzekanni, 2006).

Leading researchers and practitioners in the Assistive Technology (AT) field such as Bausch & Hasselbring, 2004; Edyburn, 2004; Judge & Simms, 2009; Parette, Peterson-Karlan, & Wojcik, 2005; Parette, Peterson-Karlan, Smith, Gray, & Silver-Pacuilla, 2006; Silver-Pacuilla, 2006 have recommended integrating AT into teacher education programs. Preparing future special educators to use AT is necessary because the Individuals with Disabilities Education Act (IDEA, 1997) and its amendments [Individuals with Disabilities Education Improvement Act (IDEIA, 2004)] require that all educational teams serving students with Individualized Educational Programs (IEPs) consider various ATs and identify services to support their implementation in the U.S.

The definition of assistive technology used in IDEIA is “any item, piece of equipment or product system, whether acquired commercially or off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities” [IDEIA 2004]. The IDEIA 2004 also defined AT services as “any service that directly assists an individual with a disability in the selection, acquisition, or use of an assistive technology device”. On a practical level, these mandates require that teachers, particularly special educators, must a) be aware of available technologies, b) select devices or programs that can increase the performance and functioning of their students, c) assist students with using technologies and evaluating their effectiveness in instructional environments, d) effectively integrate technologies into instruction to ensure improved learner performance, and e) collaborate with related service providers, parents, and/or

technology specialists on AT decisions. Although these mandates have been in place for several years, preparing future teachers to use AT in classroom settings continues to be a challenge.

Inadequate pre-service AT preparation has been cited as a primary obstacle in achieving meaningful integration and use of ATs among students with disabilities in school settings (Abner & Lahm, 2002; Bryant, Erin, Lock, Snow, Allan, & Resta, 1998; Edyburn, 2005; Judge & Simms, 2009; Michaels & McDermott, 2003; Wojcik, Peterson-Karlan, Watts, & Parette, 2004). Although the importance of integrating technology into teacher preparation programs has been established, few universities provide AT certification or training (Alper & Raharinirina, 2006; Lahm, 2005; Todis, 1996), and insufficient preparation has limited the number of professionals using AT in classroom settings (Edyburn, 2004; Judge, 2001).

Results from surveys conducted within the last ten years substantiated inadequate AT preparation among special education teacher candidates. Michaels and McDermott (2003) surveyed coordinators of graduate special education teacher education programs across a sample of institutions of higher education with graduate special education certification programs. These authors measured how programs integrated AT knowledge, skills, and dispositions into graduate educational programs and determined how coordinators would ideally like to have AT integrated within their programs.

Coordinators indicated that AT knowledge, skills, and dispositions were addressed by (a) infusing AT into coursework, (b) dedicating coursework on AT, (c) aligning practices with general and special education standards, and (d) providing opportunities for actual or simulated experiences. However, survey results indicated a significant difference between current instruction on AT for pre-service teachers and what coordinators reported as being ideal. Most coordinators noted that AT instruction was dependent on individual faculty members and that, as a whole, their programs were inadequately preparing teacher candidates for using and integrating AT into classroom settings. There is no such study which has been done on visually impaired students in public teachers' colleges and therefore there is a research gap to be filled by this study. This study will use assistive technology to boost Kiswahili performance in public teachers' colleges.

The purpose of assistive technology is to work around specific deficits, rather than fixing them. AT helps people with learning differences reach their full potential and live satisfying, rewarding lives. Assistive technology, however, should be a part of an overall program to help individuals with learning differences. Examples of assistive technology include "hi-tech" items, such as reading machines that read books out loud through a computerized voice to help persons with reading difficulties. Speech recognition systems also belong to the hi-tech group. These systems allow the user to write stories by talking to a computer, rather than having to write the words out by hand. "Low-tech" devices include more common, inexpensive tools. For example, tape recorders enable individuals with memory or listening difficulties to permanently capture spoken information. Both types of

assistive technology make life easier for persons with learning differences by allowing them to gather information and express their own ideas using the method that works best for them (Hasselbring and Bausch, 2006).

Kim, et al., (2006) argues that as teachers aim towards a goal of having all students provided with the same educational opportunities despite of their differences, there is need to include Assistive technology (AT) in the process of evaluation of a student's needs. Assistive technology (AT) covers the wide range of adaptive techniques, as well as equipment used by anyone who has difficulty performing a task, especially reading, writing or using a computer. A student who displays difficulty performing any reading activity or play activity can benefit from an assistive technology evaluation to see if he is performing to the best of his abilities, or if an adapted or assistive device would be helpful. Holding material very close to the eyes, leaning very close to the desk in order to see what they are doing, requiring lots of light but being bothered by glare, these are all signs of a student requiring their vision assessed to determine what is going on with their eyes and what might be helpful. All students with a vision loss need to be provided with an assistive technology evaluation and follow-up training on how to use the technology while in college. These technologies, whether low or high tech, will be lifelong supports to these students, for enhancing their ability to independently function as adults at school and at home.

Learning disabilities are professionally diagnosed learning difficulties with reading, writing, speaking, listening, spelling, reasoning or mathematics that are the result of a presumed central nervous system dysfunction. Learning disabilities are neither

cured nor outgrown. Students with learning differences grow up to be adults with learning differences. However, with hard work and helpful tools such as assistive technology, students with learning differences can greatly improve their success and academic performance (Balajthy, 2005). Although teachers tend to think of learning differences in terms of the school setting, students with visual impairment must also function at home, in the workplace, at social gatherings and in recreational activities (Derer, Polsgrove, & Reith, 1996). Easily portable tools, many of which are pocket-sized, allow individuals to bring a bypass strategy into many different settings and assist the students to learn with much ease.

Assistive technology (AT) helps to increase the independence of students with learning differences. Many times, these students rely on parents, siblings, friends and teachers for help. Yet over-reliance on others may slow the transition into adulthood. It may also lower self-esteem, as it requires persons with learning differences to depend on others, rather than themselves, to solve a problem. Assistive technology provides a means for students with learning differences to accomplish specific tasks on their own (Kim, et. al., 2006). Barriers to the adoption of assistive technology include lack of appropriate training and support, negative staff attitudes, inadequate assessment and planning, insufficient funding, difficulties obtaining and maintaining the equipment and time constraints. Cost or lack of funding is a barrier mentioned in virtually all the research on the implementation of assistive technology, especially in regards to students with mild disabilities (Copley & Ziviani, 2004; Jones, Valdez, Nowakowski & Rasmussen, 1995). An intervention can be done in teaching Kiswahili to visually impaired students by use of assistive

technology. Digital recorder can help the visually impaired student to be independent in their studies and avoid reliance on the other students hence boosting Kiswahili performance.

2.3 Types of Assistive Technology

According to Hasselbring and Bausch, (2006), it is important to understand that not all assistive technologies are appropriate for all students with disabilities. Visually impaired students have their own unique set of strengths, weaknesses, interests, experiences and special abilities. Therefore, an assistive technology that may be a blessing for one student may be useless for another. Similarly, a technology that is appropriate for one purpose in a particular setting may be of little value in another situation. So, when choosing an assistive technology, it is good to consider the specific individual, the setting and the task(s) to be performed.

There are three types of assistive technologies i.e. written language, reading and listening technologies which appear under general headings according to the main area of difficulty. Some technologies may appear under more than one heading, since they may be useful for more than one area of difficulty (Copley, & Ziviani, 2004). The three types of technologies are helpful to visually impaired students and can boost Kiswahili performance. The technology operates as follows:

2.3.1 Written Language Technologies

Word processors are computer-based writing systems that enable the user to type text onto a computer screen before printing on paper. In this way, the VI can easily remove or add words, move sentences, and correct punctuation and spelling. Text is

also easily underlined, boldfaced or centered. The ability to rearrange text in these ways may help reduce a writer's fear of making errors, since the text can be changed easily. This frees the VI to focus on what she wants to express, rather than on making the paper error-free. She can be confident that her efforts will result in a neat, clean and presentable document something she can feel proud of.

Spell checkers are part of most word processing programs. They are also available as stand-alone desktop and pocket-size tools. Those attached to word processors scan a written document, show the user (usually by visually highlighting the word) any misspelled words, and offer a list of suggestions for the correctly-spelled word.

Braille Note takers: Braille note takers are small, portable devices that enable students to enter and store Braille characters in the form of words and sentences. The note takers use the same six keys found on a traditional Braille writer used for making a paper copy of Braille. However, most note takers allow VI to review what they have written by listening to the text-to speech function of the device. In addition, software translators allow the Braille to be converted into text.

Proofreading programs are sometimes called "grammar checkers" as well. They are used in combination with word processing programs to check for errors in grammar, punctuation, capitalization and word usage. Suspected errors are identified on the computer monitor, and the user is given a chance to correct them before printing the document. Unfortunately, many proofreading programs are not completely accurate; they may miss a number of errors. They may also prompt the user to change parts of the text that were not incorrect.

Speech synthesizers, together with *screen review* software, enable the user to hear text on a computer screen spoken aloud. Words are spoken in a computerized or “synthetic” voice through a sound card installed either inside or outside the computer. Visually impaired students can hear the words spoken aloud. Hearing the text may help persons catch writing errors such as problems with grammar, or words that have been left out that they might not have noticed. Listening to text may also help users determine if their writing makes sense, and if it really means what they are trying to say. Speech synthesis is especially helpful to those who are better listeners than readers. Proof reading technology can be very useful to students with visual impairment because it can assist the student to realize his spelling mistakes in Kiswahili especially when fitted with Kiswahili software.

Speech recognition systems allow a visually impaired student to operate a computer by speaking to it. In combination with a word processor, the user dictates to the system through a microphone. The spoken words then appear as text on the computer screen. There are two basic types of systems: discrete and continuous speech. Discrete systems require a short pause of approximately 1/10 of a second between words. Continuous speech systems allow the VI to dictate without pausing between words. If speech recognition systems incorrectly recognize a word, the user can choose the correct word from a list of similar sounding words displayed on the screen. The more the system is used, the better it becomes at recognizing the user’s spoken language. Speech recognition systems may be most helpful to VI students whose oral language abilities are strong.

Word prediction programs work together with word processors. These programs predict the word a student wants to enter into the computer. The person types the first letter of a word, and the program offers a list of words beginning with that letter. If the desired word appears, it can be chosen from the list by pressing the number on the keyboard that is displayed next to that word or by pointing and clicking with the mouse. That word will automatically be inserted into the sentence. If the desired word does not appear on the list, the user continues to type the next letter until it does appear. After the user chooses a word, the computer predicts the next word in the sentence. Again, it offers a list of possible words, even before the first letter is typed. These programs may also assist people who struggle to come up with the exact word they want to use in a sentence. This technology can boost Kiswahili performance.

2.3.2 Reading Technologies

Optical Character Recognition (OCR) enables the VI student to input hard copy text, such as books and letters, directly into a computer. The computer or, more specifically, the speech synthesizer reads the text back out loud. In this way, the individual can hear as well as see the text. The OCR works with a scanner. The scanner reads images and text from the printed page. Next, it inputs the information into a computer file, and then onto a computer screen. The OCR changes the printed text from the scanner into computer/electronic text. OCR systems are available as self-contained units, which act solely as reading machines, or as systems which work together with personal computers. OCR systems are particularly helpful to VI

students who have difficulty reading printed words, and those who can better understand what they hear than what they read. This technology can assist VI students to perform better in Kiswahili because the assistive technology will read for the students what they cannot see.

Tape Recorders can be used to play audio taped text. Students with reading differences can work around their problems by listening to recorded text (books, magazines and newspapers), rather than reading it. Taped text, such as books-on-tape, is available from many different sources ranging from toy and record stores to the Library of Congress National Library for the Blind and Physically Handicapped (Hasselbring and Bausch, (2006). In this study the researcher used a digital recorder to make available to the VI students the information which is in texts and the VI cannot see it. It is assumed that this will boost Kiswahili performance for the VI students.

Variable Speech Control (VSC) tape recorders enable the listener to play audio taped text faster or slower than it was originally recorded, without losing the actual sounds of the words. This feature may be quite useful for students with visual impairment who understand spoken language better when the material is presented at a slower pace. On the other hand, some students find that they can review material faster by speeding up the tape. VSC tape recorders typically allow listeners to slow down the original recording speed by 25% and increase the playback speed up to 100%.

2.3.3 Listening Technologies

Personal FM Listening systems bring a speaker's voice directly into a listener's ear by means of a small transmitter unit (with a microphone), and an equally small receiver unit (with a head- or ear-phone). These wireless systems make the speaker's voice sound stronger, which benefits the VI who has difficulties in focusing on what a speaker is saying. A dial on the receiver unit controls the volume.

Tape and digital recorders are used to capture spoken information, such as a teacher's instructions or a classroom lecture. This permanent record allows students with visual impairment to refer back to an oral presentation. Students who have difficulty processing, understanding or remembering what they hear may find this very helpful. VSC tape recorders may be particularly helpful, since they allow the user to slow down or speed up the recording.

This study used digital recorder as an intervention in recording Kiswahili instruction from the teacher. The visually impaired students listened to the recorded information and used it to boost their Kiswahili performance.

2.3.4 Environmental Facilitators and Barriers and the Role of ATs

Predispositions to technology use and actual use depend on many factors, and these have been organized into a model developed by Scherer and colleagues (Scherer, 2002, 2004a, 2005). The settings in which the person uses a device or technology tend to either support or discourage use. These extend beyond physical access to social and economic support. Attitudinal and cultural factors are environmental

influences that comprise a key component of a technology user's perspective of AT, support use in general, and degree of confidence and trust in professionals and their recommendations.

Because AT is intended to facilitate health and psychosocial functioning, lack of resources to purchase AT constitutes an environmental barrier. Scarcity of trained personnel to assist in choosing and obtaining AT also represents an obstacle within the social environment (as do policies that set a low priority on resource allocation for AT). The failure of a service provider to require a comprehensive assessment of consumer needs, priorities, and AT preferences at the beginning of the AT and support selection process is also a significant barrier.

2.3.5 The Need for Comprehensive AT Assessment

Given the uniqueness of the disability experience for any given individual (Scherer, 2005) and that individual AT preferences tend to vary, it is crucial that rehabilitation psychologists collaborate with AT providers who have the knowledge and training to identify the appropriate technology for an individual and to ensure that this technology is tailored to the individual's needs (Scherer, 2002, 2004a, 2005). The result of a technology-focused intervention goes beyond the device itself and involves a personalized blend of supports, including AT, environmental accommodations and strategies, and support from others.

The prerequisite task for achieving the appropriate balance of supports and accommodations is a comprehensive evaluation of the characteristics of the technology, the individual, and the relevant environments that may affect the match

between the client and an assistive device or other support (Bruner-Canhoto, 2004; Cushman & Scherer, 1995; Scherer, 2002, 2004b; 2005; Boyle et al, Scherer, Coombs, & Hansen, 2003). For example, an important characteristic of the Environmental Factors domain, often overlooked in AT assessment, is the broader culture in which the AT user lives. Parette, Huer, and Scherer (2004) present the following parameters for AT decision making to help professionals discover more appropriate AT devices and supports from a broader cultural perspective: Establish partnerships with the individual and family throughout the entire process, Identify cultural assumptions of all involved in the decision making, Acknowledge community and cultural value systems and differences in perceptions, and Ensure culturally sensitive solutions that are appropriate for the AT user.

As further elaborated by Thomason (1990), the physical environments of AT use vary among cultures. For example, before planning to equip rural Native Americans with assistive devices, Thomason advised the consideration of terrain and availability of electricity. Factors such as environmental accommodations, available resources such as private insurance that covers devices or availability of personal assistance and special opportunities such as placement in a rehabilitation center with the newest equipment) are also important environmental characteristics.

Once a comprehensive assessment has been completed, the key to a device's usefulness is the extent to which it meets a user's specific technology requirements. These needs are beginning to be addressed as more ATs become available and evidence accumulates on the factors associated with optimal AT use. Increased availability brings expanded choice in devices and features, and the availability of

device options means that differences among individual users can be more readily accommodated. Ironically, with these technological advances and expanded options, the process of matching person and technology has become both more consumers directed and more complex. Today, all aspects of a person's cognitive, physical, and sensory capabilities must be taken into account in technology selection because many devices require a combination of such capabilities as sequencing skills, dexterity, vision, and hearing (Scherer, 2002, 2004c).

Further emphasizing the importance of the Personal Factors domain in predicting AT use, previous research has shown that when users play a larger role during the assessment, it is more likely that the most appropriate assistive devices will be prescribed to meet their personal needs. For example, Wielandt (2003) evaluated the importance of clients' perceptions of their disability and their views of specific AT devices before AT recommendations were made. She surveyed 167 clients upon hospital discharge and their use of recommended AT for bathing, toileting, and dressing. She identified seven primary variables predictive of successful AT use, including participants' (a) perceptions of AT characteristics, (b) level of anxiety, (c) ability to recall AT training, (d) negative perceptions of one's disability or illness, (e) perceived AT benefit, (f) intent to use the AT, and (g) ability to exercise choice in the AT selection. Wielandt (2003, p. 138) concluded,

Overall, these findings point to the need for occupational therapists to ensure that the adaptive equipment prescription process is client-related. Previously occupational therapists may have centered their treatment goals on improving a client's functional ability and independence. However with the emergence of the

social model of rehabilitation and the use of the newly revised factors, which recognizes the social construct of disability, it is vital to consider the clients' opinions and expectations regarding treatment outcomes. The use of a client-related model such as the Matching Person and Technology (MPT) Model, which considers Milieu–Person–Technology factors, to guide the process when prescribing adaptive equipment, could be incorporated into current occupational therapy practice to enhance the best match between clients' needs and adaptive equipment about disability/illness, perceived benefit and choice during the equipment selection process.

2.3.6 Personal Factors and ATs

The complexity of matching a person and technology arises not only from the individual's unique combination of physical, sensory, and cognitive abilities but also from people's expectations of and reactions to technologies (Scherer, 2005). These reactions emerge from personal needs, abilities, preferences, and past experiences with exposures to technologies. Predispositions to technology use also depend on factors such as one's temperament– personality, subjective quality of life/well-being, views of physical capabilities, expectations for future functioning and financial and social– environmental support and facilitators for technology use (Scherer, 2005).

Despite the increased availability of AT, approximately 30% of ATs are discarded within 1 year. Explanations for this are multifactorial, including the product not meeting user expectations or needs, setting the user apart from others, and failing to save time or energy. It is also the case that AT features designed to address one

need may negatively affect other needs. For example, a reminder system designed to be small and portable may have such small controls and displays that a person with fine motor or visual impairments cannot use it. A device that is highly customizable may have many features and optional controls that serve to make it too complex for someone with a cognitive disability to learn how to use it. However, the overriding factor accounting for the poor match of user and technology is that an inadequate assessment was done of the user's needs, preferences, and priorities.

2.4 Severity of Visual Impairment

Visual impairment is a partial or total loss of vision resulting from a medical condition, such as congenital conditions, birth trauma, diseases or injury, causing an inability to function normally. Visual impairments include a wide range of visual problems, such as deficits in acuity, visual field, eye movement, or colour perception (Greenwood, 2000).

Human eye is made up of many different parts like the cornea, iris, lens, and retina. The eye uses special optic nerves to send all the images captured to the brain where, the image is processed and recognized what is seen. This is almost an instantaneous process. Visual impairment happens when there is a problem with one or more parts of the eyes or the parts of the brain needed to process the images sent from the eyes. Most people have some type of visual problem at some point in their lives. Some can no longer see objects far away; others have problems reading small print. These types of conditions are often easily treated with eyeglasses or contact lenses. But when one or more parts of the eye or brain that are needed to process images

become diseased or damaged, severe or total loss of vision can occur. In these cases, vision cannot be restored with medical treatment, surgery, or corrective lenses like glasses or contacts.

Visual impairment also can be caused by heredity or genes. If a pregnant mother gets certain type of disease, then the chances of the unborn child developing a visual impairment is high. Accidents that hurt the eyes, infections, and some diseases also can cause visual impairment (Sewell, 2001).

The most common diseases that cause visual impairment are macular degeneration, cataracts, glaucoma, and diabetic retinopathy. Age-related Macular Degeneration is a degenerative retinal eye disease that causes the progressive loss of central vision. The Macula is the centre of the retina, which allows a person to see clearly and appreciate colours. When a person has macular degeneration the macula becomes scared. The eye may still have good side vision, but blank spots appear in the centre. In contrast to MD, the patients with Retinitis Pigmentosa or RP lose their peripheral vision and gradually they might go total blind. RP is a degenerative eye disorder that afflicts approximately one in 21,000 people; it is known that this is typically a hereditary disease where a recessive gene carries the defect. The symptoms vary from patient to patient, but in general terms begin with a loss of night vision and gradually a loss of peripheral vision. RP Patients experience a form of persistent tunnel vision that progressively closes inward encroaching on the region of central acuity (Arthur et al 2004).

Cataract is a clouding of the lens inside the eye and makes a person feel that he / she is looking through a frosty window. It may vary in its severity from a small amount of clouding to dense areas of haziness. This is usually an age related condition, which disturbs the passage of light and prevents the eye from focusing correctly. A cataract is caused by a disturbance of nutrition to the lens, resulting from a lack of oxygen. It may also be caused by injuries, radiation or exposure to toxic chemicals. Cataracts can cause blindness if it is not diagnosed and treated at its early stage. Glaucoma is an eye disease that slowly damages the fine nerves that connect the eyes to the brain. This is usually caused by a build-up of pressure in the eye. The eye is normally filled with 'intra ocular' fluid, which constantly drains away and is then replaced. In the case of glaucoma, intra ocular fluid is not drained away properly, or it may be produced in large amounts. If this causes too much pressure in the eye, the optic nerve is damaged and the blind areas in the field of vision develop. Glaucoma mostly affects the side vision. The edge of the field of vision starts to fade, causing vision to narrow.

It is estimated that well over 42 million people in the world suffer from some kind of visual handicap or reduced sight (Loumiet and Levack, 2003). These people harbour the same dreams and aspirations for a bright and fulfilling future as the non-visually impaired. Yet, no literature could be found on any research concerning their aspirations or expectations, how they perceive themselves, and how they may obtain help to support and build the confidence skills needed for independence in adulthood. Total blindness or reduced sight can have a devastating effect on the lives and personalities of those affected, as well as their families and friends, not

only monetarily, but especially emotionally. This applies particularly during the formative school years (Hodge and Keller, 1999).

Visually impaired learners are faced with a broad spectrum of challenges and frustration that can easily cause stress and emotional volatility. Such learners may have tantrums, scream, cry, be sad, and withdraw themselves from others. Nail biting is quite common to them and they tend to be forgetful. They also sometimes lag behind in learning, which later contributes to more serious learning difficulties. Mastropieri and Scruggs (2000) confirm that such a lack of vision causes learning related problems in most learners. For example, they cannot read the words on a page; they hold the book too close to their eyes while they are reading, they repeat the same line, or jump lines while reading; or they frown while reading. These students may perform poorly in Kiswahili. This study focuses on an intervention in teaching VI students who are disadvantage.

How to ensure that a student in an inclusionary setting will reach his/her potential is dependent upon the degree of independence achieved and the academic and social outcomes realized. Seven fundamentals are interrelated in the process of educating a sensory impaired child in his/her regular "home" school. These are: 1) the student needs, 2) understanding, 3) collaboration, 4) creativity, 5) expectations, 6) standards, and 7) sensitivity. If each of these areas is addressed through ongoing communication, and with professional respect and knowledge, the student will have the advantage of becoming a confident and independent contributing member of society with a valued self worth (Lowe, 2004).

It is only by addressing the individual and unique needs of students who are blind or visually impaired, through cooperation and collaboration of the team members who are responsible for a student's program, can there be successful outcomes. Team members include: school administrators, regular classroom teachers, special teachers, physical and occupational therapists, speech therapists, families, the student, and other persons who need to have information or training in working with the special needs that the student demonstrates (Wolffe and Sacks, 2002). The major challenge facing visually impaired students is the overwhelming mass of visual material to which they are continually exposed viz., textbooks, class outlines, class schedules and chalkboards writing (Alonzo,2006; Moss and Ross, 2003;). In addition, the increase in the use of films, videotapes, computers, laser disks, and television adds to the volume of visual material to which they have only limited access. To assist in overcoming a students' visual limitation requires unique and individual strategies based on that student's particular visual impairment and his/her skill of communication (Ndurumo, 1993; Martin and Hoben, 2001).This study provided an intervention of digital recorder for the VI students in teachers' colleges unlike the previous studies which did not address the challenges of VI students.

2.4.1 Teaching Learners with Visual Impairment

For the purpose of this study the term visual impairment, including blindness, was derived from the Individuals with Disabilities Act (IDEA, 2004) and was defined as "an impairment in vision that, even with correction, adversely affects a child's educational performance" (p. 598), and may be broadly classified as low vision, legally blind, or totally blind (Turnbull, Turnbull III, Shank, & Leal, 1995). To

determine eligibility for educational services, law has defined the severity of visual impairment. Low vision is a term that denotes a level of vision with an acuity level of 20/70 or less and which cannot be fully corrected with conventional glasses, and legal blindness is a level of visual impairment with a central visual acuity of 20/200 or less in the better eye with the best possible correction, or a visual field of 20 degrees or less (IDEA, 2004).

Scientists estimate that vision accounts for up to 90 percent of what a seeing child learns about the world in academic, social, and functional skill areas (MacCuspie, 1992). For this reason, special methods are required to teach children who are visually impaired (Lowenfeld, 1974). First, a child needs a rich environment, with varied and consistent experiences. These experiences should include the use of concrete objects by which he can gain knowledge about the world around him and that aid in the development of meaningful concepts. Second, a child needs opportunities in which she can learn by doing. Third, unity within the lesson must be provided, giving the child an idea of the whole task and not just a fragmented portion of the task. A child needs to learn all steps involved in a task and not just two of the steps. A child must learn to explore objects systematically so that he/she can view all of its features by using all of his/her available senses. A child with a visual impairment needs to learn to explore objects by pairing her use of vision with tactile exploration (Koenig & Holbrook, 2000).

A child with a visual impairment will have a greater chance of academic success if modifications are made in the presentation of instruction and materials. Inquiry-oriented approaches to science instruction and learning for a child with a visual

impairment have shared characteristics. Learning through use of the senses, exploring concrete objects to further understanding, questioning discoveries, and testing the discoveries become a natural occurrence to the learner with a visual impairment. Using these common instructional approaches in science classrooms will increase the students' understanding, spark further interest, and provide new avenues for the students' futures. Hands-on experiences and enactments of scientific experiments in which students directly interact with the phenomena being studied are emphasized in an inquiry-based approach to instruction. Including students with visual impairment in general education classes and preparing students to become better problem solvers and thinkers about the world around them are important opportunities that are provided to students in an inquiry-based classroom.

2.4.2 Vision Impairment and Inclusive Education

Equal opportunity legislation in many nations state that people with disabilities have access to the same opportunities as others. Unfortunately there still exists a digital divide that separates people with disabilities from achieving the equal opportunity and equal access they seek. Higher education institutions are increasingly using web pages and Internet resources for essential learning materials, and with the growing number of vision impaired students studying at these institutions accessibility issues are of paramount importance (Thompson, Burgstahler, & Comden, 2003).

However, numerous research projects report the majority of web sites visited are not accessible (Mankoff, Fait, & Tran, 2005; McEwan & Weerts 2007; Thompson et al., 2003). Inaccessible web materials promote an educational divide where

people with disabilities are denied equal access to public education (Kane, Shulman, Shockley, & Ladner, 2007), and as a result the opportunity for education for people with disabilities is less equal than that for able-bodied people. As a cohort, people with disabilities are among the least considered in the educational context of online learning (Kinash, Crichton, & Kim-Rupnow, 2004). Past research has shown that the blind lack intellectual power due to challenges to access and participate in educational institutions (Hogan & Royle, 2006), with the most significant barriers to inclusivity in education being the lack of inclusive mindset, lack of knowledge about pedagogy, high teaching loads, and lack of time for instructional development (Moriarty, 2007). Other explanations include web designers having little or no accessibility experience and a lack of information about the best ways to quickly and easily identify accessibility problems (Mankoff et al., 2005).

Accessibility groups are active in research in the challenge to fill these gaps; however, there is a long way to go before accessibility considerations are routinely included at the design stage of online and remote learning web sites.

2.4.3 Vision-centric Learning and Teaching

The dominance of the sense of vision has been the focus of much research for example; Thesen, Vibell, Calvert, & Osterbauer, 2004 and Spence, Kettenmann, Kobal, & McGlone, 2001. Of the body's five sensory inputs, vision is the key sense used in learning. Vision also modifies or dominates the interpretation from the other senses where there is variance between the inputs from more than one sense (Shore & Klein, 2001). Low vision and totally blind students must rely on input from

physical senses other than sight; however, most e-learning environments generally assume the learner has sight. Fenrich (2005) suggests that by utilizing simulations, active experimentation, discovery-learning techniques, questioning with feedback, video, animations, and photographs, practical hands-on skills can be taught virtually.

This may be the case for sighted students; however, vision impaired students do not have the sight needed to access many of these multi-media sources of delivery. Care needs to be taken with navigation, structure, content design, and communication aspects in online learning environments for students with disabilities (Pearson & Koppi, 2002).

Before discussing the methods trialed it is important to understand the obstacles faced by students with a severe vision disability studying in the areas of IT, computer science, and computer engineering. The first learning obstacle is the concentration of visual presentation of core learning content. Recent progress in technology has enabled teaching methods to move from predominantly textual forms to visual content and web-based modes of delivery. Many tertiary education institutions now incorporate industry-standard IT courses into their curriculum to aid employment of their graduates. A review of the Cisco and Microsoft e-learning materials reveals large amounts of tabular data, photographs, graphs, and charts in numerous formats such as line graphs, bar charts, pie charts, color diagrams, animation, drag and drop, buttons and icons, and a variety of interaction methods. In most cases the sighted student can easily recognize 'the thousand words' inherent in an image; however, these are seldom supported by either a detailed textual

description of the image or a discussion of the message being portrayed. Of concern in specialist fields such as computing are the effects of vision impairment on the student's ability to comprehend essential parts of the curriculum, normally taught using visual means.

Education materials in IT-related disciplines traditionally rely heavily on tables and graphics to present essential concepts, methods, and architectures. Blind students cannot see diagrams and low vision students have great difficulty comprehending what is being taught. The challenges of developing learning materials for the vision impaired and interfaces not reliant upon graphics are complex (Sánchez, 2007). Vision impaired students are increasingly being disadvantaged as teaching environments move to integrate more vision-centric methods of presentation within e-learning materials. Instructional designers need to be cognizant of the difference in needs between totally blind students, students with some useful vision, and students who are sighted. The second learning obstacle for blind and low vision students is that the majority of web-based content is not designed for assistive technologies, and as a result assistive technologies can be frustrating to use. The assistive technologies readily available to students with severe vision impairment are Braille display devices, screen enlargement software (such as Magic and Zoomtext), and screen reading software that converts text into audio such as Jaws. These commonly used assistive technologies have limited or no ability to translate graphical images. Computer based visualization techniques depend almost entirely on high-resolution graphics, and for vision impaired users the problems of using complex visual displays are great. There are currently only limited methods for

presenting information non-visually, and these do not provide an equivalent speed and ease of use to their graphical counterparts. The assistive technologies used by vision impaired and blind students may translate this information incorrectly, or not at all, leading to incomplete, erroneous, or different interpretations of concepts presented. Although research projects in the development of assistive technologies are frequently presented in the literature, the development of haptic, force-feedback, and other sophisticated technologies are still in their infancy, being environment dependent and requiring large amounts of code development and testing.

While computer-based learning has opened opportunities for many students with disabilities, it remains primarily vision dependent. The need to play and experiment in a computer environment is vital to the learning process and presents the third obstacle to those with an acute vision disability. Practical application, in contrast to didactic learning, has been presented as an essential part of the learning process dating back to Aristotle. Learning theories by Kolb, Lewin, and Piaget emphasize the need for practice, claiming experience assists in the assimilation of new knowledge and thus solidifies learning. In many cases vision-centric e-learning materials are designed to replace experiential learning previously achieved by practical application. As students with vision impairment tend to use their memory to a greater extent than their sighted counterparts, practical experience is even more crucial to concrete their learning. Students learn by processing materials via different 'lanes' to the brain (Sprenger, 1999), and experimenting in a familiar and trusted environment allows blind students to use multiple lanes to the brain,

including the physical senses, experiences, and emotional reinforcement, aiding comprehension.

The above learning obstacles, together with the lack of truly accessible e-learning education and the nature of sight disabilities means higher education and training institutions must move to more relevant multi-modal user interfaces in order to make e-learning materials more accessible to all students.

2.4.4 Categories of Visual Impairment

Inclusion of students with disabilities in assessment and accountability systems is beneficial for their educational process, but further steps need to be taken to ensure that tests measure students' performance adequately. When comparing the performance levels of students with disabilities with the performance levels of students without disabilities, researchers generally found that the performance levels of students with disabilities were lower than those of students without disabilities (Wallace, 2002; Wagner, 2002 and Thurlow, 2001). When low performance levels are obtained on assessments that provide an accurate picture of students' knowledge and skills, such test results can indicate areas in which test takers need additional instructional effort to improve their learning. However, if features of an assessment prevent students with visual impairment from accurately demonstrating their knowledge and skills, the test results have little utility in guiding instructional efforts. In this case, the assessment needs to be improved to portray students' knowledge and skills more accurately.

Blindness means that a learner has no vision at all, or only a very limited perception of light, color or objects. Such learners require major accommodations in order for them to be successful in educational settings. They have to depend heavily on their other senses, such as hearing, touch and smell, in order to learn. Such learners may, for example, use Braille, where they feel letters with their fingers, as they do not have the vision to read normal printed text. Low vision or partial sight implies significant loss of vision. The visual functioning may increase with the use of optical devices such as glasses or training, or a combination of both. Learners with low or partial sight are capable of coping with the demands of most classroom settings and apply their sense of vision in order to receive information to learn (Darling, 2010).

The very nature of visual impairments can influence the participation of students who are blind or have low vision. Students with visual impairments often miss the subtle, untaught information that provides the basis for understanding key concepts on which general education is based. The resulting gaps in concept development can later affect their ability to infer, predict, comprehend, and create during learning activities. The amount of time required for the types of learning activities that are necessary to fill these gaps can be significant and often involves providing instruction in specialized environments. Is the student able to accomplish academic tasks with the current medium with a sufficient level of success? While academic achievement is important, teachers must also examine the amount of time that a student is spending to successfully accomplish academic tasks (Shepard, 2005).

A student who must spend a majority of working hours on schoolwork needs to have options for streamlining work. Regardless of the initial decision, it is likely that a student who is visually impaired will accomplish academic tasks at a slower pace than students who are not visually impaired. It is important to remember that reading Braille or reading prints are not the only options for communication. There are other means for expressing and receiving information that may make the academic process more efficient for students, such as typing, word processing, readers, recorded textbooks, enlarged print via low vision devices, and voice synthesis devices for computers. The key is to explore the range of options that are available, identify the strengths and weaknesses of each, and provide instruction in those that will be of greatest value for the visually impaired student to be given immediate and future needs (Noghoi, 2007). An intervention in learning for VI students will be of great help to them thus boosting Kiswahili language.

(Koenig, 2003) argues that students who are blind or visually impaired simply face a barrier to accessing print. Still, low vision or a diminished perceptual field has implications for developing reading fluency at both lower processing (efficient recognition of distinctive letter features, orthographic information, and sight word recognition) and higher processing levels (syntactic, semantic, and text discourse structure). Students with assistive visual technologies such as magnification and screen readers can often develop proficiency in processes like phonemic segmentation, blending, and decoding and gain enough automatic processing using these skills to develop proficiency in vocabulary and comprehension. Addressing the needs of students with visual impairment in the right manner will boost their

performance (Ndurumo, 1993). Kiswahili teacher (mediator) should understand the severity of the visually impaired students and use an intervention in teaching VI students in order to assist them to go through the college system hence getting quality grades in Kiswahili Language.

2.5 Student- Teacher Related Factors and Performance of Visual Impaired Students

The researcher in this study was interested in finding out the student-teacher related factors which affects VI students' performance in Kiswahili.

2.5.1 Teacher attitude

Teacher attitude is one of the most important variables in the education of children with disabilities. The concept of attitude is probably the most distinctive and indispensable concept in contemporary social psychology. In the *Dictionary of Psychology*, Tan et al. (2003) defined attitude as a learned and stable predisposition to react to a given situation, person or other set of cues in a consistent way. Studies did have emphasized the importance of positive attitudes of educators toward inclusion. An attitude is a factor in one's daily living and therefore plays an important role in an educator's daily interactions with students. Teacher beliefs underlying the philosophy of inclusion are important predictors of the outcomes of inclusion. (Cole and Chan, 2000) contended that the effects of teacher attitudes on the children with disabilities could be serious. Teachers' judgments about children with disabilities could have a significant influence on children's emotional, social and intellectual development. Since general educators' willingness to include students with disabilities in their classrooms is critical to the success of inclusion, a

number of researchers have stressed the importance of understanding teachers' attitudes and beliefs toward inclusion.

In a comparative study conducted in Finland and Zambia, Thompson, White and Morgan (2003) stated that Finnish teachers perceived the inclusion of children with speech disorders, specific learning disabilities or physical disabilities to be more successful, while Zambian teachers were reluctant to include students with physical disabilities and visual impairment. The Zambian results appeared to be due to the difficulties inherent in the long distances students must travel to reach the nearest mainstream school. Severity of disability and availability of resources consistently influenced teachers' attitudes towards inclusion, regardless of differences in nationality or culture. Where disability was severe, teachers believed that the regular classroom was not an appropriate educational environment (Thompson et al., 2003).

Attitude affects achievement and achievement affects attitude (Curran and Rosen, 2006). Curran and Rosen, (2006) refer to this relationship as a dynamic interaction between feelings and behaviour as observed in performance. Curran and Rosen reveal that experienced feelings lead to a particular self-image, which in turn influences students' expectation of future performance which in turn affects their actual performance. In the introduction to understanding 'what ails Kiswahili performance yet it is our national language': Poetry in Kiswahili is usually described as the most difficult genre of literature to understand and many students shy away from studying it (Kinyanjui and Ogula, 2006). Yet poetry is the most common form of literary expression, having its origin in the oral tradition of song

and chant. Most students do not enjoy *Mashairi* because they hold that it is a foreign aspect of literature that is not related to their day-to-day lives. These students feel that poetry is not part of their lives but belongs to the poets. Students also have a negative attitude and fear *Mashairi* because of the vocabulary used especially words borrowed from ancient Swahili dialects (Njogu and Chimerah, 1999).

One strategy involved collaboration among general and special education faculty in their respective courses (Jeffs & Banister, 2006). These authors evaluated the benefits of having faculty from general and special education programs collaboratively develop assignments within their undergraduate technology classes. In this investigation, special education teacher candidates taught general education peers about various ATs, and general education candidates taught special education peers how to use various multimedia.

Results indicated that both groups gained skills and knowledge using AT and multimedia. To address the need for providing AT instruction in teacher education programs, several researchers such as Blackhurst & Morse, 1996; VanLaarhoven, et al., 2008; Wojcik, et al.; 2004 investigated the use of multimediated interventions for teaching pre-service teachers about AT. For example, Blackhurst and Morse (1996) evaluated the effectiveness of an instructional module that incorporated videos and other hypermedia components for teaching three different groups of professionals about AT. Results indicated that undergraduate, graduate, and in-service professionals were satisfied with the instructional modules.

Similarly, Van Laarhoven, et al. (2008) evaluated the effectiveness of using video tutorials (i.e., videos teaching candidates how to use various ATs) followed by hands-on experiences with technologies to teach preservice educators how to use ATs. Special and general education majors reported significant increases in familiarity with ATs comfort level using ATs, and perceived effectiveness and comfort with integrating AT into future instruction. Additionally, participants indicated satisfaction with using video tutorials as an instructional tool. Wojcik, et al. (2004) also described a model for teaching both special and general education teacher candidates how to use AT.

These authors described two different delivery models; an alternative track for elementary, middle, and secondary education teacher candidates and a traditional track for early childhood special education teacher candidates. Teacher candidates in the alternative track completed six online modules with descriptions, images, or short video clips depicting the use of AT in educational environments as well as links to Web based resources. After candidates passed online exams, they engaged in hands-on experiences and passed competency exams using selected technologies. Conversely, preservice teachers in the traditional track completed coursework specifically designated for teaching AT and also had content on AT infused within other courses. Collectively these studies suggest that collaboration between general and special education faculty and use of instructional modules, online modules, video tutorials, and/or designated coursework used in conjunction with hands on experiences are effective strategies for integrating AT into teacher education programs.

Although these strategies appear to be effective, more research is needed regarding methods, models, or approaches for systematically integrating AT within teacher education and special education programs. Many researchers (such as Bausch & Hasselbring, 2004; Family Center on Technology and Disability, 2008; Judge & Simms, 2009; Lahm & Nickels, 1999; Smith, 2000) have recommended integrating AT knowledge, skills, and practice across the sequence of courses in the special education teacher preparation curriculum (Michaels & McDermott, 2003). This integrated approach provides repeated exposure of ATs to increase teacher candidates' familiarity, skill level, and comfort level using technologies and therefore emphasizes the importance of supporting students' use of AT in classroom settings. Such repeated exposure in various courses and in various ways increases the likelihood that teacher candidates will be able to select, support and use AT effectively with their future students.

Researchers argue that most teachers have a negative attitude towards the teaching of languages and they pass the attitude to the students. This makes students disinterested and assumes that Languages lessons are just by the way. Such students spend most of the time trying to study science subjects and leave inadequate time for languages (Cole and Chan, 2000). Given this approach; visually impaired students would be poorly prepared to pass Kiswahili examinations in public primary Teachers' Colleges. Studies on student and teacher factors show that attitude affects performance. In this study the teacher who is the mediator is expected to portray a positive attitude and provide an intervention to the VI students in order for them to achieve their full potential in Kiswahili.

2.5.2 Teacher preparedness in teaching visual impaired students

Visually impaired students require modified school practices or special educational services in order to develop their full potential (Agrawal, 2004). Teachers need to be adequately prepared for delivery of special education to the visual impaired students. Special education means specially designed instruction which meets the special education and related needs of an exceptional student. It is distinguished from regular educational programme for non-exceptional students by some unusual quality, something uncommon, noteworthy. It is something special; special materials, special training techniques, special equipment and special help and for special facilities may be required for special categories of children having special needs (Ivey and Broaddus, 2000; Hughes et al., 2007). Visually impaired learners require a truly educational environment as well as teachers who can gauge their unique educational needs. In order to create a suitable educational environment, teachers should transform the school into a supportive life-space which is also a learning-space, and the school hostel into a home in which favorable learning is administered to learners. Teachers should use various ways of teaching to make even disliked subjects interesting. Learners should be guided by teachers when they choose their subjects, because teachers are aware of the learners' strengths and weaknesses (Olsen et al., 2008).

Instruction, regardless of setting, must be provided by professionals thoroughly prepared and qualified to teach students with visual impairments (American Foundation for the Blind, 2007). The skills and knowledge needed by these staff can be defined with three classifications. First, the teacher must have a foundation

in regular education, including methodology in teaching and reading areas of subject matter. Second, the teacher must learn the techniques for curriculum adaptation for visual learning experiences so that the concepts taught remain the same with adapted teaching methodology and materials. Third, the teacher must know how to assess skills and deliver instruction in the specialized areas of independent living skills, social skills, career education, and specific areas of academics (American Foundation for the Blind, 2007).

The combination of knowledge and skills needed in order to provide appropriate educational services to students who are visually impaired requires intensive preparation in a teacher training program. Most often, these programs are offered at colleges and universities, either at the undergraduate or graduate level. Experience has shown that at least one school year of preparation is necessary in order to possess entry level skills as a teacher of students with visual impairments. Programs that prepare teachers of students with visual impairments contain curricula that are not found in general teacher preparation or generic programs in special education. Competencies for special teachers of students who are visually impaired include: Development patterns in students with visual impairments; Comprehensive assessments of the students with visual impairment in all areas related to the disability; Ability to design and modify core and specialized curricula for the student with visual impairment; Knowledge of specialized technology; Special instructional strategies for the student with a visual impairment; Specialized books, materials and equipment used by the student with a visual impairment;

Appropriate specialized counselling and guidance services; Knowledge of specific local, state and national legal requirements, policies and specialized resources; Knowledge and need for research in the field; Understanding vision loss and other related impairments; Collaboration with families and other professionals. Another important unique need area is orientation and mobility which must be provided by trained and qualified orientation and mobility specialists. The teacher of students with visual impairments may share in the responsibility for reinforcing learned skills in orientation and mobility, but educational programs must offer instructional services of appropriate frequency and duration from both a specially trained teacher and an orientation and mobility specialist (American Foundation for the Blind, 2007). Through the process of mediated learning, Kiswahili teachers should assist visually impaired students to go through their primary teachers' colleges training successfully and attain quality grades in Kiswahili Language. These teachers should have a positive attitude and be prepared to provide an intervention for VI students in order for them to perform well in Kiswahili.

2.6 Teaching Methods and Strategies for Visual Impaired Students

Methods of teaching the visual impaired students such as lectures, discussion, assignment and handouts teaching methods are employed depending on the severity and availability of teaching materials. The methods cannot be employed effectively without the teachers understanding the appropriate strategies of teaching. Fuller, Healey, Bradley and Hall, (2004), assert that colleges use different teaching methods and strategies to provide special education services to identified students with disabilities. These can be broadly grouped into four categories, according to

whether and how much contact the students with disability have with non-disabled students: -

Inclusion - In this approach, students with disabilities educational needs spend all, or at least more than half, of the School day with students who do not have special educational needs. Because inclusion can require substantial modification of the general curriculum, most colleges use it only for selected students with mild to moderate special needs and this is accepted as the best practice. Specialized services may be provided inside or outside the regular classroom, depending on the type of service. Students may occasionally leave the regular classroom to attend smaller, more intensive instructional sessions in a resource room, or to receive other related services that might require specialized equipment or might be disruptive to the rest of the class, such as speech and language therapy, occupational therapy, physical therapy, or might require greater privacy, such as counselling sessions with a social worker.

Mainstreaming refers to the practice of educating students with disabilities in classes with non-disabled students during specific time periods based on their skills. Students with disabilities are segregated in separate classes exclusively for students with special needs for the rest of the school day.

Segregation - This is done in a separate classroom for students with disabilities: In this model, students with disabilities spend no time in classes with non-disabled students. Segregated students may attend the same school where regular classes are provided, but spend all instructional time exclusively in a separate classroom for

students with disabilities. If their special class is located in an ordinary school, they may be provided opportunities for social integration outside the classroom, e.g., by eating meals with non-disabled students. Alternatively, these students may attend a special college.

Exclusion - A student who does not receive instruction in any college is excluded from college. Historically, most students with disabilities have been excluded from colleges, and such exclusion may still occur where there is no legal mandate for special education services, such as in developing countries like Kenya. It may also occur when a student is in hospital, housebound, or detained by the criminal justice system. These students may receive one-on-one instruction or group instruction. Students who have been suspended or expelled are not considered excluded in this sense.

According to Kenya Institute of Education (K.I.E, 2006), methods of teaching can be grouped into two broad categories namely heuristic and didactic approaches. Heuristic methods encourage active participation and involvement of students. They include question and answer, demonstrations, investigations, probing, group work and discussions. Didactic approaches are characterized by expository teaching techniques in which the teacher assumes the role of the sole authority as far as knowledge is concerned. The role of the learner is that of passive recipient of knowledge. Didactic methods include lecture, deductive and inductive methods. However, the methods may change depending on the students' ability and the nature of the topics. Findings from research studies with disabilities have supported

the argument that Languages should not be taught to students with visual impairment through didactic methods (K.I.E., 2006).

According to Klein and Merritt (2004), a constructivist teaching approach leads to improved student achievement because it develops critical thinking, interpretation and analytical skills. Students with disabilities primarily learn through the sense of vision and studies have shown that multimedia approaches enhance factual recall as compared to traditional lecture formats. The combined effects of clear signing, use of media, structured lesson material and the involvement of students with visual impairment through the use of questions throughout the lessons have been found particularly important in terms of performance in past tests (Lang, 2005). Lang, suggests the use of strategies to encourage students to think before attempting to solve problems; demonstrating strategies including signing out loud using peer observers; requiring written explanations of strategy; and using more than one strategy to solve a problem. Technology also offers options to teachers for adapting instruction of students with disabilities. The above study of Klein, Merritt and Lang does not offer a solution to VI students. This study dealt with assistive technology for the VI students in order to boost Kiswahili performance.

A research carried out by K.I.E (2006); revealed that in Kenya the commonly used teaching methods were, lecture method, problem solving, examples and discussion group. However, on average, it was found that lecture method, problem solving and examples were commonly used. Findings of Chama Cha Kiswahili cha Taifa (CHAKITA) (Njogu, 2008), revealed that Kiswahili teachers were still using lecture method in teaching Kiswahili. These studies however, did not establish the methods

of teaching used in Kiswahili in colleges for students with visual impairment. This study aimed at using intervention methods of teaching Kiswahili in colleges for the students with visual impairment and their influence on performance in Kiswahili in PTE examination. In this particular study, discussion method was emphasised. Visually impaired students in public primary teachers' colleges are supposed to be assisted by Kiswahili teachers through intervention learning to go through the college system and acquire quality grades in Kiswahili Language.

2.6.1 Teaching and Learning Materials for Students with Visual Impairments

A great deal of research e.g., Van Bon et al., 2004 and Corn et al.2004 highlights the importance of the availability of material and human resources, including appropriate training and technological aids for teaching of visual impaired students. In the past, professionals believed that use of vision could impair sight even further. It was common practice to blindfold, and teach Braille reading to all students who were visually impaired and, therefore, "save their sight" for other tasks. The decision to teach Braille reading was made without consideration of visual functioning. Today, best professional practice and federal legislation specify that educational decisions must be made by a multidisciplinary team according to the individual needs and abilities of each student. These decisions must be based on information obtained from systematic procedures. Such procedures must be used to determine the most appropriate reading medium for each child (Corn et al., 2002).

The degree of impairment and the student's background and training (like the degree of proficiency in Braille) will affect the usefulness of the various strategies and suggestions. The student with visual impairment will most likely need

assistance in all aspects of science programs. The various teaching methods and strategies given below work for most visual impaired students although some may not (Van Bon et al., 2004). Full participation of students with visual impairments in general education classes is also affected by the need to access print materials using alternative methods. The reading speeds of students who use Braille tend to be slower than those of students who use print and those of students with low vision who use magnification devices (Cowen & Shepler, 2000) and large print (Corn et al., 2002; Van Bon et al., 2004). Even when assistive technology such as electronic devices are used, valuable academic learning time can be lost while locating the correct section of an audiotape, digital recorder or note taker, opening the correct application and getting ready to take notes or prepare written materials. Studies done earlier show that VI students tend to be slow in learning as compared to the sighted students in reading (Nolan and Kederis, 2003; Trent and Truan, 1997; Wormsley, 2006). This study used assistive technology intervention in teaching Kiswahili to VI students in order to assist them to learn fast as their sighted counterparts.

The current and future range of computer and related assistive technology has the potential for increasing a student's level of independence by providing more immediate and efficient access to information. The multidisciplinary team must keep abreast of technological advances and have sufficient knowledge of their potential impact in order to evaluate the effectiveness for each student with a visual impairment. As computer courses become more and more widespread throughout the educational system, it is likely that students will have exposure to them when appropriate access devices are available. However, if such is not the case, it is the

responsibility of the teacher of students with visual impairments to provide this exposure, given the relative value of the technology to the student's immediate and future needs.

While the options are expensive, some to consider include voice-accessible word processors; large-print word processors; cassette Braille devices; portable computer systems; telecommunications; and optical recognition scanners with conversion to speech, Braille, or print, as well as new devices as they become available (Corn et al. 2002). Apart from text books, teachers can use other forms of instructional materials to facilitate learning. (Nkuuhe, 1995; Ayot and Patel, 1997) comments that words alone are liable to distortion. This is especially so with students. With such a prevailing situation; teachers are compelled to seek aiding that encounters the necessity of educational media. The media used by the teachers determine whether the learners will get captivated and alert or they will lack zest (Nkuuhe, 1995). Media facilitates the understanding of complicated concepts and ideas. They make learning a captivating and fulfilling experience. They make easier for learners to follow, understand, respond to and retain the content of the lesson as reflected by (Joyce et al, 2004; KISE, 1995). This study used digital recorder to teach Kiswahili poetry skills to VI students in order to assist them pass in the subject.

There is a belief among psychologists that in human life people learn eleven percent (11%) through hearing, eighty three percent (83%) through sight and retain only twenty percent (20%) of what they hear (Ayot and Patel, 1997). This can affect Kiswahili performance of students with visual impairment because there are those students who have low vision and others who cannot see. A number of studies argue

that visual media have the ability to demonstrate the physical aspect of lesson objects as well as translating the non-visual concepts in the lesson. That is, they provide sensory concreteness. This is important in the teaching and learning of Kiswahili language, (Joyce et al., and 2004). From the above assertion, it is clear that media resources are very important in assisting students to learn. Therefore this study was designed to use assistive technological intervention in teaching VI in order to boost their performance in Kiswahili in public primary teachers' colleges. Kiswahili teachers should use the available materials appropriately to assist the visually impaired students to go through the college system and perform well in Kiswahili Language.

2.6.2 Instructional Strategies for Students with Disabilities

Throughout the eighties, much literature emerged documenting that students with learning disabilities (LD) have strategy deficits that negatively impact their performance. For example, several researchers reported that students with LD exhibit deficits in developing and executing specific strategies and fail to use self-regulation (Fleischner & Garnett, 1980; Goldman, 1989; Pressley, Symons, Snyder, & Cariglia-Bull, 1989; Swanson & Rhine, 1985). Recent Investigations have identified some of the specific strategy problems that students with LD exhibit when attempting to solve problems For example, Montague, Bos, and Doucette (1991) found that although students with LD may possess a degree of strategy knowledge, such knowledge may be incomplete, insufficient, or inappropriate when

applied to problems. These authors also found that students with LD did not paraphrase or visualize when attempting to solve word problems.

Several other researchers (Hutchinson, 1993; Montague & Applegate, 1993; Zawaiza & Gerber, 1993) concurred with Montague et al.'s findings and further reported that students with LD lack critical strategies necessary for representing problems that involve converting linguistic and numerical information.

In spite of these deficits, individuals with LD can be taught specific strategies that will improve their language performance. Fortunately, strategy instruction has been found to be effective for elementary students (Mercer & Miller, 1992a; Smith & Alley, 1981; Sugai & Smith, 1986; Willott, 1982); junior high students (Bennett, 1982; Case, Harris, & Graham, 1992; Montague, 1992; Montague, Applegate, & Marquard, 1993; Rivera & Smith, 1988); high school students (Hutchinson, 1993; Montague & Bos, 1986); and college students (Zawaiza & Gerber, 1993) with LD. So, regardless of age, teaching specific strategies for learning appears to provide students with the necessary tools to succeed.

Erwin, Perkins, Ayala, Fine, and Rubin (2001) studied the impact and implementation of Playtime is Science for Children with Disabilities (PSCD). The PSCD curriculum is an approach to activities-oriented science instruction that incorporates science and scientific thinking into the daily routines of children identified with a disability. Through implementation of PSCD, the teacher reinforces the connection between children's play and science learning. Erwin and colleagues adapted the PSCD curriculum to meet the needs of students with a visual

impairment. Two classroom teachers and their nine students from the first and the fourth grades participated in the study. The students attended a state funded residential school serving students with a visual impairment.

Methods included observation with field notes, student and teacher interviews, and a teacher focus group. Student-related outcomes were identified through analyses of data. Positive peer-related skills, creating meaningful connections about the world, and teacher support of student learning had an impact on the students' knowledge and learning of scientific concepts. The study by Erwin et al (2001) is important to the field of education of students with visual impairments and to the field of language education. Erwin et al focused on the impact of inquiry-based instruction for children with a visual impairment, and addressed a gap in the literature spanning two decades. Also, the authors concluded a meaningful learning environment for students with a visual impairment is one in which teachers provide guided opportunities for students to pursue their own interests and answer their own questions. This finding shows the importance of the current reform documents of the NRC in which inquiry-based instruction in classrooms is promoted (1996). Erwin et al found active involvement, peer interaction, discussion, and the use of prior knowledge to construct new knowledge were essential in helping the students understand the concepts.

The small sample size of nine students is a limitation to the Erwin et al. (2001) study. Also, because the study was conducted in a residential school setting, comparisons between mainstreamed classrooms including both children with disabilities and children without disabilities cannot be made; therefore,

generalizations across students and classrooms are restricted. Although research on inquiry-oriented approaches in education for children with visual impairments is limited, the use of inquiry-based instruction in classrooms has been reported as successful for students with other disabilities. Palincsar, Collins, Marano, and Magnusson (2000) and Palincsar, Magnusson, Collins, and Cutter (2001) studied the engagement and learning of students with learning disabilities as the students participated in the Guided Inquiry Supporting Multiple Literacies (GIsML) approach to instruction (Magnusson and Palincsar, 1995). This approach is based on the authors' knowledge of research and practice of intentional learning and scientific activity. In GIsML instruction, inquiry is guided by a broad question that includes a general concept (e.g. Why do things sink or float?). Students are engaged in inquiry through cycles of investigation. The authors indicated learning occurs in a socially mediated community of inquiry (cf. The Cognition and Technology Group at Vanderbilt, 1994), in which small groups of students attempt to answer specific questions and whole groups of students compare and contrast their ideas and findings with the findings of others. In the course of GIsML instruction, students and teachers participate in two forms of investigations. In firsthand investigations, children have experiences related to the phenomena they are investigating. In secondhand investigations, children consult text for the purpose of learning from others' interpretations of phenomena or ideas.

As a second purpose to their study, Palincsar et al (2000) addressed how collaboration was used to help students with special needs realize success in inclusion classrooms. Through observational methods, the researchers developed

five case studies of students with learning disabilities that were used to create a set of claims concerning the engagement and learning of these students. The case study of a 4th grade boy identified with a learning disability was presented. Through the use of field notes from classroom observations, positive student outcomes were revealed (e.g. demonstrating success on inquiry-oriented tasks, seeking assistance in journal writing, engaging in scientific problem solving, and actively participating in discussions).

Different instructional techniques are used for some students with disabilities. Instructional strategies are classified as being either *accommodations* or *modifications*. An *accommodation* is a reasonable adjustment to teaching practices so that the student learns the same material, but in a format that is accessible to the student. Accommodations may be classified by whether they change the presentation, response, setting, or scheduling, (Cole and Chan, 2000). For example, the school may accommodate a student with visual impairments by providing a large-print textbook; this is a presentation accommodation. A *modification* changes or adapts the material to make it simpler. Modifications may change what is learned, how difficult the material is, what level of mastery the student is expected to achieve, whether and how the student is assessed, or any other aspect of the curriculum. For example, the college may modify a reading assignment for a VI student by substituting it with a shorter and easier book. A student may receive both accommodations and modifications.

According to Cole and Chan, (2000), some of the examples of modifications include: -

a).**Skipping subjects** – This is where students may be taught less information than typical students, skipping over material that the school deems inappropriate for the student's abilities or less important than other subjects. VI students can skip difficult Kiswahili poems and attempt others.

b).**Simplified assignments** - Students may read the same literature as their peers but have a simpler version, for example '*Sikate Tamaa* and *Taaluma ya Ushairi* with both the original text and a modern paraphrase available in Kiswahili poetry.

c).**Shorter assignments** - Students may do shorter homework assignments or take shorter, more concentrated tests, for example; 2 Kiswahili poems instead of 4.

d).**Extended time** - Students with lower processing speed may benefit from extended time in Kiswahili assignments and/or tests in order to comprehend questions, recall information, and synthesize knowledge.

Some of the examples of accommodations include: -

a).**Response accommodations** - Typing homework assignments rather than hand-writing them (considered a modification if the subject is learning to write by hand). Having someone else write down answers given verbally.

b).**Presentation accommodations** - Listening to audio books rather than reading printed books. These may be used as substitutes for the text, or as supplements intended to bolster the students' reading fluency and phonetic skills. Similar options include designating a person to read text to the student, or providing text to speech software. This is considered as a modification if the purpose of the assignment is reading skills acquisition. A helper can take notes during lectures.

c). **Setting accommodations** – This involves taking a test in a quieter room. Moving the class to a room that is physically accessible; for example; on the first floor of a building or near an elevator, arranging seating assignments to benefit VI students. This can be done by sitting at the front of the classroom.

Alahmadi, (2007) points out that student with disabilities fail in colleges for a variety of reasons. In some cases, their academic difficulties can be directly attributed to deficiencies in the teaching and learning environment. For example, students with limited English or Kiswahili language may fail because they do not have access to effective bilingual or English as a Second Language (ESL) instruction. Students from lower socioeconomic backgrounds may have difficulty if instruction presumes middle-class experiences. Other students may have learning difficulties stemming from linguistic or cultural differences. These difficulties may become more serious over time if instruction is not modified to address the students' specific needs. Unless these students receive appropriate intervention, they will continue to struggle, and the gap between their achievement and that of their peers will widen over time. This study used assistive technology to solve these problems identified by Alahmadi.

Students need specialized instruction because of specific learning disabilities. There is over representation of the Kiswahili language learners in special education classes. Educators have difficulty distinguishing students who truly have learning disabilities from students who are failing for other reasons. Students learning Kiswahili are disadvantaged by a scarcity of appropriate assessment instruments and a lack of personnel trained to conduct linguistically and culturally relevant

educational assessments (Alahmadi, 2007). Kiswahili language learners who need special education services are further disadvantaged by the shortage of special intervention educators who are trained to address their language and disability-related needs simultaneously. Improving the academic performance of students from non-Kiswahili backgrounds requires a focus on the prevention of failure and on early intervention for struggling learners.

d).Collaborative college-community relationships: Parents of students with disabilities learning Kiswahili must be viewed as capable advocates for their children and as valuable resources in college improvement efforts. By being involved with the families and communities of Kiswahili learners, educators come to understand the social, linguistic, and cultural contexts in which the students are being raised. Thus, educators learn to respect cultural differences in child-rearing practices and in how parents choose to be involved in their children's education ((Madden, Slavin, Karweit, Dolan and Wasik, 2003).

e).Academically rich programs: Students with visual impairment who are learning Kiswahili must have opportunities to learn advanced skills in comprehension, reasoning, and composition and have access to curricula and instruction that integrate basic skill for development with higher order thinking and problem solving.

f).Effective instruction: Students with disabilities must have access to high-quality instruction designed to help them meet high expectations. Teachers should employ strategies known to be effective with Kiswahili learners, such as drawing on their

prior knowledge; providing opportunities to review previously learned concepts and teaching them to employ those concepts; organizing themes or strands that connect the curriculum across subject areas; and providing individual guidance, assistance, and support to fill gaps in background knowledge.

g).Early intervention for struggling students: Most learning problems can be prevented if VI students are in positive school and classroom contexts that accommodate individual differences. However, even in the most positive environments, some students with disabilities still experience difficulties. For these students, early intervention strategies must be implemented as soon as learning problems are noted (Madden et al., 2003).

h).Clinical teaching: Clinical teaching is carefully sequenced teaching. First, teachers teach skills, subjects, or concepts; then they re-teach using different strategies or approaches for the benefit of students with disabilities who fail to meet expected performance levels after initial instruction; finally, they use informal assessment strategies to identify the possible causes of failure (Madden et al., 2003). Teachers conduct curriculum-based assessment to monitor student progress and use the data from these assessments to plan and modify instruction. Kiswahili teachers in TCs can employ clinical teaching when handling VI students in order to boost their performance.

i).Peer or expert consultation: Kiswahili peers or experts work collaboratively with general education teachers to address students' learning problems and to implement recommendations for intervention (Fuchs and Fuchs, 1999). For

example, teachers can share instructional resources, observe each other's classrooms, and offer suggestions for improving instruction or managing behaviour. Kiswahili teachers can help VI students by demonstrating strategies to integrate learners in mainstream classrooms. In colleges with positive climates, Kiswahili subject members can work together and share the goal of helping students with visual impairment.

j).Teacher Assistance Teams (TATs): TATs can help teachers resolve problems they routinely encounter in their classrooms (Fuchs and Fuchs, 1999). These teams can comprise of four to seven Kiswahili teachers and the teacher who requests assistance, design interventions to help struggling students with disabilities. Team members work to reach a consensus about the nature of a student's problem; determine priorities for intervention; help the classroom teacher to select strategies or approaches to solve the problem; assign responsibility for carrying out the recommendations; and establish a follow-up plan to monitor progress. The classroom teacher then implements the plan, and follow-up meetings are held to review progress toward resolution of the problem. Kiswahili teachers performed the task of intervention in teaching the VI student as they go through the college system in order for them to get quality grades in Kiswahili.

2.6.3 Teaching and Performance of Visually Impaired Students

The risk of poor academic performance and the potential for frustration that is associated with slow reading speed has been a topic of concern for students with visual impairments (that is, those who are blind or have low vision) for more than a decade (Corn et al., 2002). Students with visual impairments often have slow

reading rates (Fellenius, 2001; LaGrow, 2000) and slow reading rates have a negative impact on the acquisition of literacy skills (Koenig and Holbrook, 2003). Negative attitudes toward braille, large print, or reading in general may also affect reading performance (Erin and Sumranveth, 1995; Weaver, 2003 and Frank, 2000). A significant role for teachers of students with visual impairments (hereafter vision teachers) is to address their students' slow reading rates and attitudinal barriers through the use of appropriate instructional strategies and assisting technology tools. Two major factors that lead to slower reading rates among students with visual impairments are the type of visual impairment and visual acuity, with lower visual acuity resulting in reduced reading rates (Krischer & Meissen, 2000). Furthermore, the disparity between the reading rates of sighted students and students with low vision increases as students' progress to middle school and high school (Corn et al., 2002). Despite some explanations that suggest specific eye anomalies are more detrimental to reading performance than others (Van Bon et al., 2000), it is unclear which factors contribute to the variability in reading achievement of children with low vision. In fact, the finding that some children with low vision read very well suggests that other factors other than visual impairment affect student performance.

Students with visual impairments or blindness rely on a host of supports and accommodations to read in the classroom, yet the same supports and accommodations may not be available for state assessments. In the United States of America, although nearly every state offered English Braille as a test of accommodation in 2003, the use of Braille in four states was restricted or had

implications for scoring and aggregation (Lazarus et al., 2006). In other words, some students in those states had the option to take tests in Braille, but those students might automatically receive a non-proficient score or their scores might not count. Large print was allowed by nearly all states as an accommodation without restrictions. Read-aloud accommodations, which are often used by students with visual impairments or blindness who are not using Braille or print enlarging technology, were more controversial in states' accommodation policies (Lazarus et al., 2006). Although nearly all states allowed tests to be read aloud, only two permitted read-aloud accommodations with no restrictions; in six states, this accommodation was non-standard but there were no implications for scoring or aggregation, 26 states permitted questions to be read aloud only under certain circumstances, and 11 states allowed this accommodation under certain circumstances and with implications for scoring. The above studies show that students had a negative attitude towards the use of Braille and that VI student have slow reading rate. This study employed an intervention in teaching the VI students in order to boost their reading ability and therefore achieve quality grades in PTE.

Teaching children with exceptionalities takes careful thought and hard work. When a student has a combination of exceptionalities the job is made tougher. Learning with a VI is difficult enough, but imagine if that is coupled with learning a second language. Language learning materials produced specifically for blind or visually impaired people are very rare and, if they do exist, are mostly not up to standard. In print, more up-to-date books do exist; they are, however, basically translations of materials that were originally conceived for sighted people and are therefore very

much focused on visual input. And even if Braille books describe the pictures of the black print edition, they cannot recreate the immediate contact a sighted student would have with the subject.

Just as there has been extensive research on the relationship between language and visual impairment by researchers in the field of visual impairment, so, too, have there been numerous studies of the relationship between proficiency in the mother tongue and competence in a second language by researchers in the field of applied linguistics (Zimmer-Gembeck et al., 2006 and Wagner et al. 2002). Wagner et al. (2002) stated that since the 1960s, studies have consistently demonstrated that proficiency in one's mother tongue exerts a "predominantly positive influence" on second language competence. They cited studies in which error analysis was used to determine that only 4 - 23 percent of grammatical errors in speakers of a second language were traceable to interference by a first language and that the majority of these errors were of syntax, rather than morphology. Students with visual impairments or blindness face unique challenges when reading. Yet with targeted interventions and accommodations in reading instruction and assessment, these students can become proficient readers. Understanding the characteristics of students with visual impairments or blindness that may affect reading is an important step toward the development of effective instruction and appropriate assessments (Zimmer-Gembeck et al., 2006). Zimmer-Gembeck study based his argument on the first language proficiency in order to perform better in second language. This study is concerned with an intervention which can be provided to a student in order for him to perform better in PTE in Kiswahili.

The Kiswahili language, the subject of this study, has acquired the status of a national language in at least two countries: Kenya and Tanzania. According to Ruo (1994), Kiswahili was declared the national language of Kenya by the country's first president Jomo Kenyatta in 1964. Ten years later; he directed that the language be used in parliament alongside English, which was hitherto the only parliament language. Bwenge (1994) states that Kiswahili was declared the national language of Tanganyika in 1963. Moreover, Kiswahili is also the *de facto* official language of the larger Tanzania. [Bwenge (1994), Mreta (1998), Mohammed (2001)].

In addition, as Mathew (1997) states, the language is widely used in Kenya, Tanzania, Uganda and the Eastern part of Democratic Republic of Congo (DRC) in general communication and interactive discourses. He also states that the language is increasingly used in cities as a first language. It is also used widely for commercial and mercantile purpose. The language is also gaining greater acceptance in Rwanda, Burundi, Zambia and Malawi.

A number of scholars, *inter alia* Habwe (1999), Okombo (2001) and Iribemwangi (2010) view Kiswahili as a *lingua franca* in the African region. In fact, Okombo (2001) observes that with the exception of Afrikaans, Kiswahili is the most privileged indigenous language in Sub-Saharan Africa. This view is not only held by Kiswahili scholars but also many other pragmatic and renowned scholars as exemplified in Chimerah (2000). Chimerah quotes such researchers as Whiteley, Ali Mazrui and even Wole Soyinka from West Africa (an area where Kiswahili has not really established itself) arguing the case for Kiswahili as African *lingua franca*.

Chimerah argues that Kiswahili is a mobilizing tool that is spoken in the East African coast from Brava all the way to Mozambique.

However, one of the most steadfast proponents of Kiswahili as a world language is Ngugi wa Thiong'o. Ngugi wa Thiong'o (1993) argues the case for all indigenous languages, he holds the view that Kiswahili is the 'all Kenya national language'. He goes on to suggest that Kiswahili should be made one of the languages of the United Nations (UN). In fact, as at 2005, the UN itself was considering approving Kiswahili as one of its working languages. Thiong'o further states that Kiswahili is the unifying language of culture and commerce (1993). Kiswahili is a Bantu language spoken by various groups that inhabit several large stretches of the Indian Ocean coastline from northern Kenya to northern Mozambique, including the Comoros Islands.

Kiswahili is taught as a language in many universities and higher education institutions worldwide. American black schools in the U.S.A. teach Kiswahili as a second language to black students. Most of the Universities teaching Kiswahili are in the U. S. A, but they are also famous schools of Kiswahili in U.K, Germany (several universities), Russia (St. Petersburg and Moscow State University), among others. Kiswahili is a very important Language in the world and all students including the students with visual impairment must perform well in it. Though it is not possible at this point to give an estimate of the number of students studying Kiswahili as a subject, it is safe to assume that Kiswahili is the most widely taught African language in the world, (Mulokozi, 2000). An assistive technological

intervention in teaching visually impaired student to boost their performance in this important language in the world will be very helpful.

2.7 Theoretical Framework

2.7.1 Kozulin's Mediated Theory

The study was guided by Kozulin's Mediated Theory proposed in 2002. It states that, for learning to take place there has to be some interventions between the material to be learned (content) and the learner (Kozulin, 2002). Mediated Learning Experience (MLE) describes a special quality of interaction between a learner and a teacher, who will be called a "mediator". The function of a mediator is different from that of a teacher and the mediator will provide an intervention by use of an assistive technology as illustrated by the following diagram.

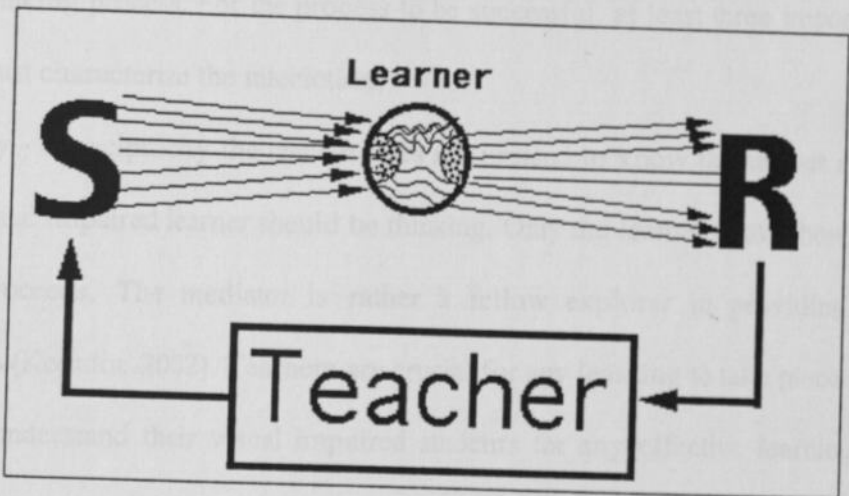


Figure 1: Stimulus and Response between the mediator and student

Source: (Kozulin, 2002)

In this mode the teacher provides a suitable stimulus (homework, test, assignment, etc.) and then observes the response of the learner to the stimulus. Based on the

response, the teacher (mediator) provides an intervention and interacts with the student (praises, criticisms, encourages, grades, and gives new assignments) and the process is continued until either the teacher or the learner is satisfied or time runs out (Kozulin, 2002). Kiswahili teachers must be competent and willing to follow up students' progress until they grasp the subject matter. The teachers develop their own repertoire of methods depending upon the size of the class, the apparent ability of the learner(s) and the subject matter.

The intentionality of the mediator is different from that of a teacher. The mediator is not concerned with solving the problem at hand. Rather the mediator is concerned with how the learner approaches solving the problem (Kozulin, Kaufman and Lurie, 2007). The problem at hand is only an excuse to involve the mediator with the learner's thinking process. For the process to be successful, at least three important qualities must characterize the interaction.

Reciprocity - In reciprocity the teacher does not pretend to know the answer as to how the visual impaired learner should be thinking. Only the learner knows how the thinking proceeds. The mediator is rather a fellow explorer in providing an intervention (Kozulin, 2002). Teachers are crucial for any learning to take place and they must understand their visual impaired students for any effective learning to take place.

Mediation of Meaning - The mediator interprets for the visually impaired learner the significance of what the learner has accomplished. The mediator also mediates feelings of accomplishment. "Now that you have figured that out, you can probably use the same method on this harder problem" (Kozulin, 2002). In various ways the

mediator causes the visual impaired learner to reflect not just on the solution to the problem but also on how the solution was obtained and the generalizations, which flow from it. The teacher as well must be willing to commend the visual impaired student when he/she does well to arouse more interest to gain some more knowledge.

Transcendence - It is the ability to transfer knowledge learned from one experience and use it in other situation. The teacher by way of arousing interest through assistive technology in the learner, introducing the material to be learnt, normally does the intervention, interpreting and explaining the same in order to make it understandable to the visually impaired learner. At last the teacher evaluates to ascertain if learning has taken or is taking place (Kozulin, Kaufman and Lurie, 2007).

Learning should be generalizing experience. If a visually impaired student does not learn from experience that student does not gain experience and therefore learning does not take place in that student (Musau, 1999). Teachers by way of arousing interest to the student, introduce the material to be learned and explain the same to make it understandable to the student with visual impairment. At last the teacher ascertains if learning has taken or is taking place. For transcendence to be viable Kiswahili teachers will have to select appropriate instructional techniques, teaching aids, learning resources and motivate students to have positive attitude towards the subject. The effective teacher aims to facilitate learning through the use of assistive technology and control the learning process so that in the classrooms, activities occur simultaneously with much collaborative activity among students and between

teachers and students (Sternberg and Grogorenko, 2003). In mediated learning the teacher takes the central role of controlling the classroom for effective learning by use of appropriate teaching methods and assistive technology to boost performance of Kiswahili.

The Kozulin's Mediated Theory informs the study that for students with visual impairment to perform well in Kiswahili language, the teacher (mediator) needs to consider the severity of the student; assistive technology used, student-teacher related factors and methods of teaching used by the teachers in preparing to teach the visually impaired students. This study, basing on this theory places the teacher at the centre of the assistive technology in teaching, due to the crucial mediation role played in influencing the performance of visual impaired students in Kiswahili. In this study the teacher determines the tempo of learning for visually impaired students by use of assistive technology to boost their performance in Kiswahili and assist the teacher trainees to leave the college as better teachers.

2.7.2 The Systems Theory

General System Theory was developed by Ludwig von Bertalanffy in 1968 and others. Schools are social systems in which two or more persons work together in a coordinated manner to attain common goals (Scott, 2008). All schools are open systems, although the degree of interaction with their environment may vary. According to open-systems views, schools constantly interact with their environments. In fact, they need to structure themselves to deal with forces in the world around them (Scott, 2008).

A system can be defined as an interrelated set of elements functioning as an operating unit (Senge, 2006). As depicted in Figure 2, an open system consists of five basic elements (Scott, 2008): inputs, a transformation process, outputs, feedback, and the environment.

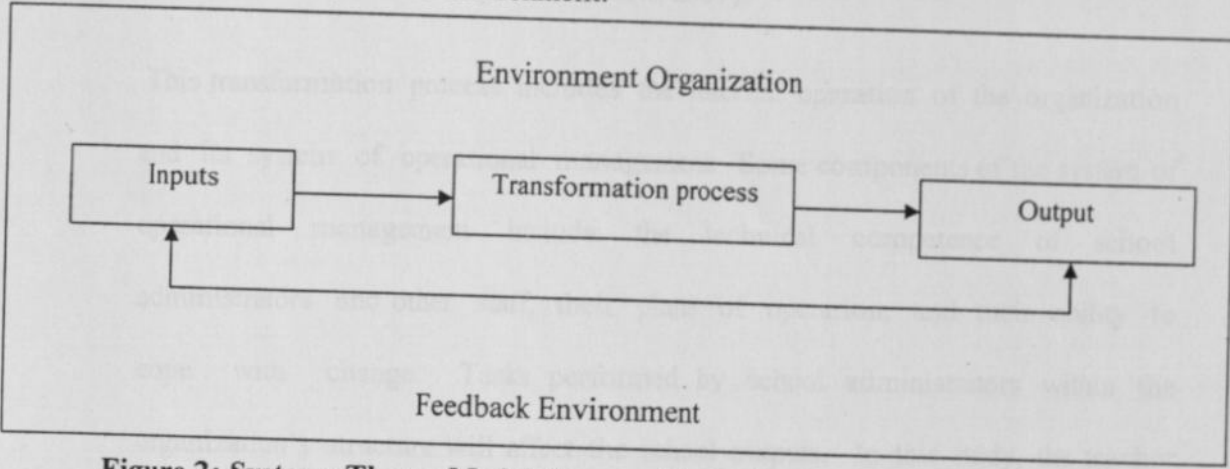


Figure 2: Systems Theory Model, Source: (Scott, 2008)

Inputs: Systems such as schools use four kinds of inputs or resources from the environment: human resources, financial resources, physical resources, and information resources. Human resources include administrative and staff talent, labor, and the like. Financial resources are the capital the school/school district uses to finance both ongoing and long-term operations. Physical resources include supplies, materials, facilities, and equipment. Information resources are knowledge, curricula, data, and other kinds of information utilized by the school/school district. In this study the inputs include the teachers, visually impaired students' assistive technology and teaching materials used.

Transformation Process: The school administrator's job involves combining and coordinating these various resources to attain the school's goals – learning for all. The interaction between visually impaired students and teachers is part of the

transformation or learning process by which students become educated citizens capable of contributing to society. How do school administrators accomplish this? Work of some kind is done in the system to produce output. The system adds a value added to the work in process (Shaw, 2007).

This transformation process includes the internal operation of the organization and its system of operational management. Some components of the system of operational management include the technical competence of school administrators and other staff, their plans of operation, and their ability to cope with change. Tasks performed by school administrators within the organization's structure will affect the school outputs. In this study, the teacher used assistive intervention of teaching materials such as digital recorder to add value to visually impaired students and therefore boost their performance in Kiswahili language.

Outputs: It is the principal's job to secure and use inputs to the schools, transform them while considering external variables to produce outputs. In social systems, outputs are the attainment of goals or objectives of the school and are represented by the products, good results, outcomes, or accomplishments of the system. Although the kinds of outputs will vary with a specific school, they usually include one or more of the following: growth and achievement levels of students and teachers, student dropout rates, employee performance and turnover, school-community relations, and job satisfaction. The desirable outputs in this study are the achievement of quality grades by the visually impaired students in Kiswahili language.

Feedback: Feedback is crucial to the success of the school operation. Negative feedback, for example, can be used to correct deficiencies in the transformation process or the inputs or both, which in turn will have an effect on the school's future outputs. In this study due to poor performance in the Kiswahili language, it is recommended that causes of deficiencies are identified and corrected in the transformation process. Assistive technology was used for intervention of visually impaired students' poor performance in Kiswahili.

Environment: The environment surrounding the school includes the social, political, and economic forces that impinge on the organization. The environment in the open systems model takes on added significance today in a climate of policy accountability. The social, political, and economic contexts in which school administrators work are marked by pressures at the local, state, and federal levels. Thus, school administrators today find it necessary to manage and develop internal operations while concurrently monitoring the environment and anticipating and responding to external demands. In this study, the environment surrounding the school comprises of various stakeholders who include the government departments (such as the Ministry of Education), the parents, sponsors and Kenya Institute of Education (for Curriculum development).

2.8 Conceptual Framework

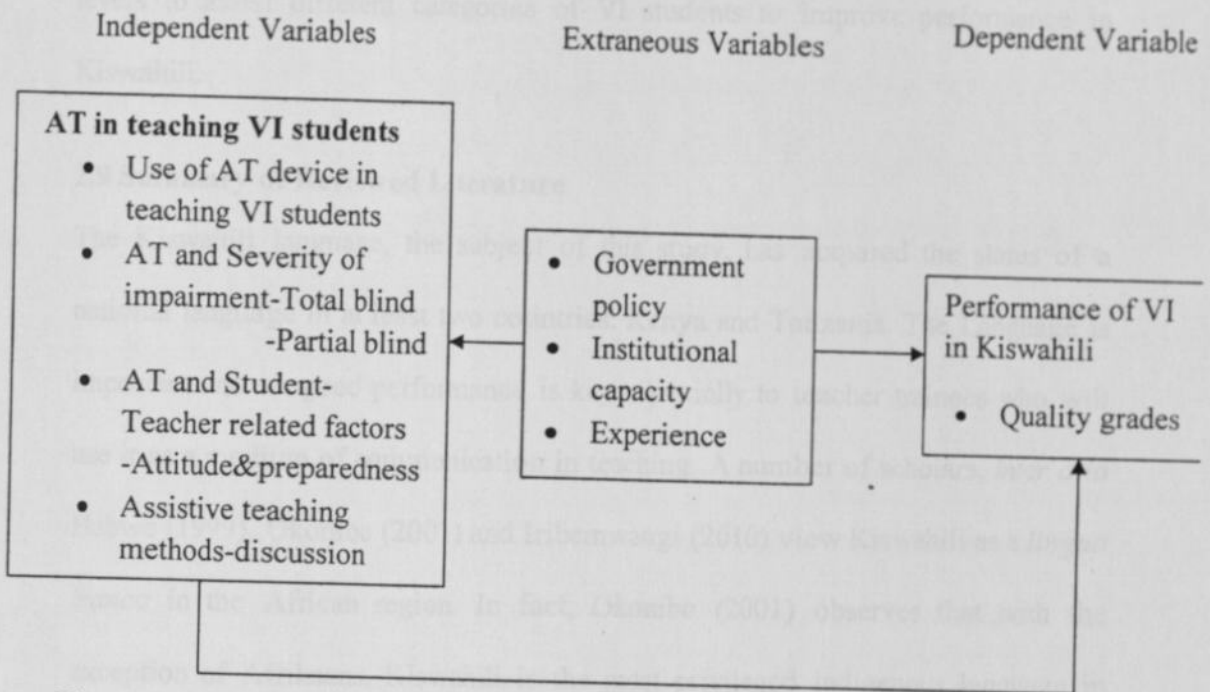


Figure 3: Relationship between use of AT in teaching visual impaired students and their performance in Kiswahili language

The study conceptualizes that use of AT device in teaching; use of AT on VI students' severity, use of AT on student-teacher related factors and use of assistive teaching methods (independent variables) influence performance (dependent variable) of visual impaired students in the Kiswahili language.

Independent variables affect (dependent variable) performance. However, extraneous variables such as government policy and institutional capacity (or operational environment of the college) can determine the way independent variables affected dependent variable. Performance is measured in quality grades which range from fail distinction. The Kenya National Examinations Council (KNEC) is the examining body for the Kiswahili language under study. In both the

mediated and systems theories the researcher used AT intervention at different levels to assist different categories of VI students to improve performance in Kiswahili.

2.9 Summary of Reviewed Literature

The Kiswahili language, the subject of this study, has acquired the status of a national language in at least two countries: Kenya and Tanzania. The Language is important and its good performance is key especially to teacher trainees who will use it as a medium of communication in teaching. A number of scholars, *inter alia* Habwe (1999), Okombo (2001) and Iribemwangi (2010) view Kiswahili as a *lingua franca* in the African region. In fact, Okombo (2001) observes that with the exception of Afrikaans, Kiswahili is the most privileged indigenous language in Sub-Saharan Africa. This view is not only held by Kiswahili scholars but also many other pragmatic and renowned scholars as exemplified in Chimerah (2000). There is need therefore to assess the AT devices used to assist the VI students according to their severity, the assistive methods of teaching used and assistive methods used to boost the student- teacher related factors affecting performance in Kiswahili. The researcher used assistive technology in teaching the VI students to improve their performance in Kiswahili.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is sub divided into several sections as follows: research design, location of the study, description of the target population, sample size and sampling procedures, research instruments, reliability and validity, data collection procedure and data analysis.

3.2 Research Design

The study adopted quasi experimental design by use of a pre test and post test. This data can be compared as part of the study or the pre-test data can be included in an explanation for the actual experimental data (Morgan, 2000). This design was appropriate to analyse the treatment effect of using AT in teaching VI students in one group while applying the natural teaching methods on the control group. With quasi-experimental studies, it may not be possible to convincingly demonstrate a causal link between the treatment condition and observed outcomes. Human beings cannot be exposed to experimental research which can be degrading to them. This is particularly true if there are confounding variables that cannot be controlled or accounted for (Rossi et al., 2004).

3.3 Target Population

Target population comprised of all the visually impaired students in the three public primary teachers' colleges in Kenya (Asumbi, Machakos and Mosoriot), that deals with students with visual impairment (MOE, 2011). Asumbi is situated in Homabay; Mosoriot is in Uasin Gishu, while Machakos is in Machakos County.

The accessible population comprised of the principals, teachers and students with visual impairment in the three colleges. There were 32 second year VI students in the three colleges, 3 Principals, and 22 Kiswahili teachers as shown in Table 2

Table 2: Target Population

Colleges	Total number of visual impaired students	Principals	Teachers (Kiswahili)	Total
Asumbi TTC	9	1	6	16
Mosoriot TTC	9	1	7	17
Machakos TTC	14	1	9	24
Total	32	3	22	57

3.4 The Sample Size and Sampling Procedure

The purposive sampling techniques were used to sample the respondents with the desired characteristics. The total number of respondents was 57; comprising of 32 visually impaired students, 22 Kiswahili teachers, and 3 Principals, however Asumbi TC respondents were sampled through simple random sampling and used for pilot study. The pilot study results were mainly used to test the validity and reliability of the research instruments and therefore its findings were not included in the final data analysis. In the final data collection and analysis Mosoriot and Machakos teachers' colleges were sampled by use of simple random sampling to get a control group and an experimental group. Mosoriot was used as control group with 9 VI students while Machakos teachers' college with 14 VI students had a

group of 7 VI students as experimental and another group of 7 VI students as control group.

3.5 Research Instruments

The study used questionnaires, interview schedule and observation approach.

3.5.1 Questionnaires

Two sets of questionnaires were used for collecting data from the students and the teachers. The questionnaire combined both open-ended and closed-ended questions which were administered to the respondents. Low vision students used a large print questionnaire and the totally blind students used Braille print questionnaire. A standardized pre-test was administered to two colleges (Mosoriot and Machakos teachers' college). A post test was administered to the two colleges after Machakos TC (experimental) group had received a treatment of AT teaching by the use of digital recorder and assistive teaching method of group discussion to teach Kiswahili poetry to VI students.

3.5.2 An interview schedule

An interview schedule was used for collecting data from the principals. Structured interview and in-depth interviews were the two types of interviews used in research evaluation by the researcher. In structured interviews, emphasis was to obtain answers to carefully phrased questions whereas under in-depth interviews, the interviewers sought to encourage free and open responses, and this allowed a trade-off between comprehensive coverage of topics and in-depth exploration of a more limited set of questions.

Patton (2002) asserts that, the quality of the information obtained through these methods is largely dependent on the interviewer's skills and personality. In-depth interviews also encourage capturing of respondents' perceptions in their own words and is a very desirable strategy in qualitative data collection.

3.5.3 Observation Method approach

The observation approach entailed taking of photos in respect to what is observed pertaining the study. According to (Schmuck, 1997), the method provide researchers with ways to check for nonverbal expression of feelings, determine who interacts with whom, grasp how participants communicate with each other, and check for how much time is spent on various activities.

3.5.4 The Digital Voice Recorder

A digital voice recorder is a handheld device designed to record voice and sound with superior sound recording and playback, without the need for media. For individuals who may be visually impaired, a digital voice recorder can be a beneficial tool. With simple instruction, a visually impaired person can easily use a digital recorder for a variety of personal or professional uses that are made difficult without the use of sight (White et. al 2002). The researcher used the device in recording of poetry instructions which were used in the experimental group to learn poetry skills.

3.6 Validity of Research Instruments

According to Kothari (2004), validity refers to the accuracy and meaningfulness of inferences, which are based on the research results. It is the degree to which results obtained from the analysis of the data actually represent the phenomenon under

study. The content and construct validity of the research instruments was determined by the researcher, discussing the items in the research instruments with the supervisors and other lecturers in the Department of Educational Communication and Technology. The advice given by these experts helped the researcher to determine the validity of the research instrument. At Machakos teachers' college where there was the control and experimental groups the researcher separated the two groups to take care of threats to validity.

3.7 Reliability of Research Instruments

Reliability is a measure of the degree to which a research instrument yields consistent results after repeated trials (Nsubuga, 2000). Mugenda and Mugenda (2003) define reliability of an instrument as the degree of consistency with which it measures a variable. It is concerned with estimates of the degree to which a research instrument yields consistent results or data after repeated trials. Reliability was computed for a combination of all sections of the questionnaire. A pilot study was done at Asubi teachers' to help fine tune the questionnaire so as to measure what the researcher intended to measure. The findings from the pilot study were used to enhance the reliability of the instruments to adjust, alter and delete certain items as a way of improving their reliability.

3.8 Procedure of Data Collection

The researcher collected a research permit from the Ministry of Education in order to visit the sampled colleges for the study in the month of January, 2013. A pre-test was administered in the two sampled colleges (Mosoriot and Machakos TCs). Mosoriot TC (control group) did not receive a treatment. One group of Machakos

TC did not receive a treatment while the other (experimental group) received a treatment of assistive technological intervention teaching by use of digital recorder. The experimental group listened to the Kiswahili poetry instructions which were recorded in the digital recorder before the post-test. All the Kiswahili teachers in Machakos TC formed a team which gave an intervention to the 7 students (experimental group) in the college. The teachers, who were research assistants through the guidance of the researcher, supervised the group discussions composed of the VI students. 7 (experimental group) VI students were put in motivated and guided discussion groups. These students were given a digital recorder containing the Kiswahili poetry instructions to listen to in a period of one month. The digital recorder information was also downloaded to computers and then made available to the VI students to listen to. The group discussion method of teaching and the use of assistive technology were used in teaching the Kiswahili poetry. A post-test was given to the VI students of Mosoriot TC and Machakos TC after one month regardless of the treatment. The results of the two groups were analysed to determine the impact of using guided discussion and AT in teaching Kiswahili.

3.9 Data Analysis

Data collected was edited, coded, classified and tabulated with regard to the type and source. During the editing process, the researcher carefully scrutinized the raw data collected from all the respondents with a key objective of ensuring that it was accurately, uniformly and completely entered. The edited data was then coded according to the research themes. Data was analysed and interpreted both qualitatively and quantitatively in the light of the research objectives. Analysis of

data was conducted with the aid of the Statistical Package for Social Sciences (SPSS). The analysis entailed computation of descriptive statistics (frequencies and percentages). The research hypothesis and the significance of the findings were tested using the paired t-test regarding the treated and the control group. Since the sampled population of the students was less than 30, t-test was the most appropriate in this study where the mean of two paired samples was compared. When two samples are involved and the values for each sample are collected from the same individuals (that is, each individual gives us two values, one for each of the two groups), or the samples come from matched pairs of individuals then a paired-samples t-test may be an appropriate statistic to use.

The paired samples t-test can be used to determine if two means are different from each other when the two samples that the means are based on were taken from the matched individuals or the same individuals.

3.10 Ethical consideration

All those who participate in the research as respondents were not coerced into participating in the research as the researcher wrote notifications in advance for any of the participant's thus promoting informed consent for all that were involved. There was voluntary participation where by all prospective research participants were fully informed about the procedures and potential risks involved in the research.

The researcher ensured that all participants were guaranteed confidentiality and that participants were also assured that identifying information was not to be made available to anyone who was not directly involved in the study. The strict standard

of anonymity was employed which meant that the participants remained anonymous throughout the study even to the assistant researchers themselves. Other ethical issues that were adhered to included honesty where the researcher strove to maintain truthfulness in reporting data results by ensuring that there was no fabrication, falsehood, or any misrepresentation of data. Further, objectivity was applied where the researcher avoided bias in the research design, data analysis, data interpretation, peer review, personnel decisions, and expert testimony among others.

Primary Teachers' Colleges in Kenya. The study targeted 33 randomly selected students, 22 Kisumu-based teachers, and 2 Principals. The return rate of the questionnaires was 100%. This response rate was sufficient and representative and conforms to Mugenda and Mugenda's (2003) stipulation that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good while a response rate of 70% and over is excellent. This commendable response rate was due to extra efforts that were made via personal calls to convince the respondents to fill in and return the questionnaires. The chapter covers the personal information, and the findings based on the objectives.

The chapter covers the demographic information, and the findings are based on the objectives. The study made use of frequencies on single response questions. On multiple response questions, the study used Likert Scale in collecting and analyzing the data. A Likert scale of 5 points were used in comparing the results and drawing conclusions. These were then presented in tables, graphs, and charts as appropriate with explanations being given in prose.

CHAPTER FOUR

DATA PRESENTATION, ANALYSIS, INTERPRETATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents analysis and findings of the study as set out in the research methodology. The results were presented on impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary Teachers' Colleges in Kenya. The study targeted 32 visually impaired students, 22 Kiswahili teachers, and 3 Principals. The return rate of the questionnaire was 100%. This response rate was sufficient and representative and conforms to Mugenda and Mugenda (2003) stipulation that a response rate of 50% is adequate for analysis and reporting; a rate of 60% is good while a response rate of 70% and over is excellent. This commendable response rate was due to extra efforts that were made via personal calls to remind the respondents to fill-in and return the questionnaires. The chapter covers the personal information, and the findings based on the objectives.

The chapter covers the demographic information, and the findings are based on the objectives. The study made use of frequencies on single response questions. On multiple response questions, the study used Likert Scale in collecting and analyzing the data whereby a scale of 5 points were used in computing the means and standard deviations. These were then presented in tables, graphs and charts as appropriate with explanations being given in prose.

4.2 Socio - Demographic Information

The study initially sought to inquire information on various aspects of respondents' socio-demographic information, that is; the respondent's sex, education level, duration of teaching and the language commonly used by visually impaired students. This information aimed at testing the appropriateness of the respondent in answering the questions regarding the impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary Teachers' Colleges in Kenya.

4.2.1 Gender distribution of the respondents

The study sought to establish the sex distribution of the respondents and the findings are as shown in Table 3.

Table 3: Gender distribution of the respondents

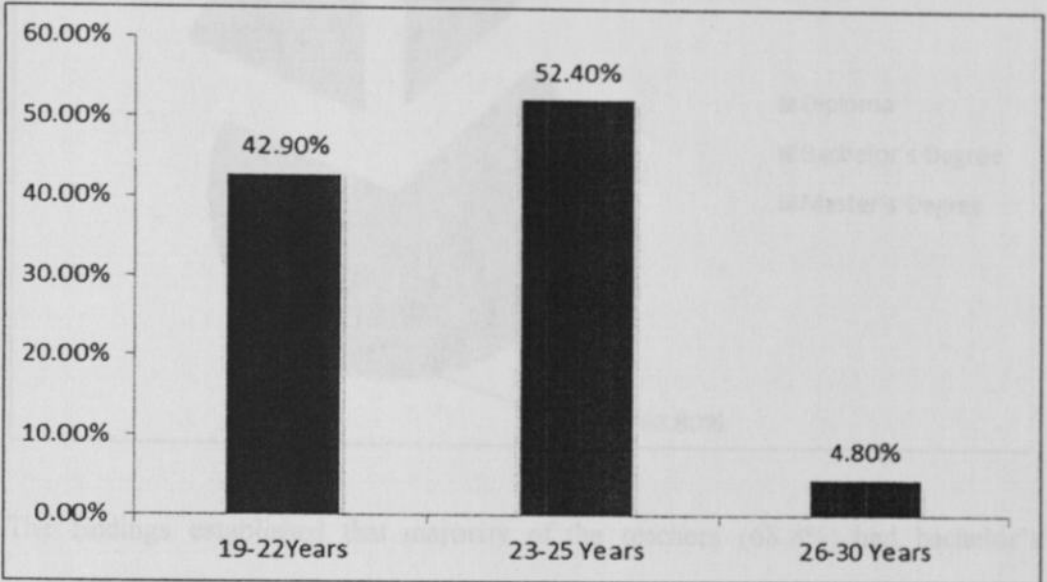
	Students		Teachers	
	Frequency	Percent	Frequency	Percent
Male	14	60.9%	5	31.3%
Female	9	39.1%	11	68.8%
Total	23	100.0	16	100.0

From the findings, 60.9% of the students were males while 39.1% were females. This depicts that there was gender disparity in the recruitment of students at the tertiary institutions. Meanwhile 68.8% of the teachers were female while 31.3% were male. This depicts that there is gender disparity in the recruitment of staff at the tertiary institutions.

4.2.2 Age distribution of the Students

The students were asked to indicate their age. The study findings were illustrated in Figure 4.

Figure 4 Age distribution of the Students

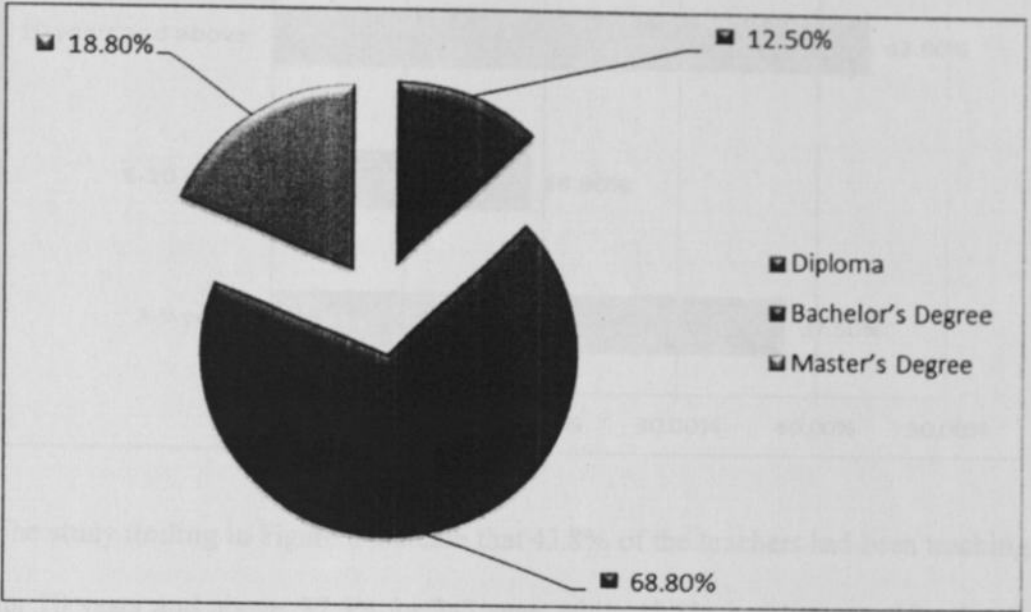


According to the findings, majority of the students (52.4%) were 23-25 years old, 42.9% were 19-22 years old while only 4.8% were 26-30 years old. This depicts that the students were youthful and energetic and therefore had a great potential to excel in their academics and future careers. Therefore investing on interventions like the assistive technology by the tertiary institutions would be critical in enhancing their academic performance.

4.2.3 Teachers' highest level of Education

The teachers were further to indicate their highest level of Education and their responses are as shown in figure 5.

Figure 5 Teachers' highest level of Education

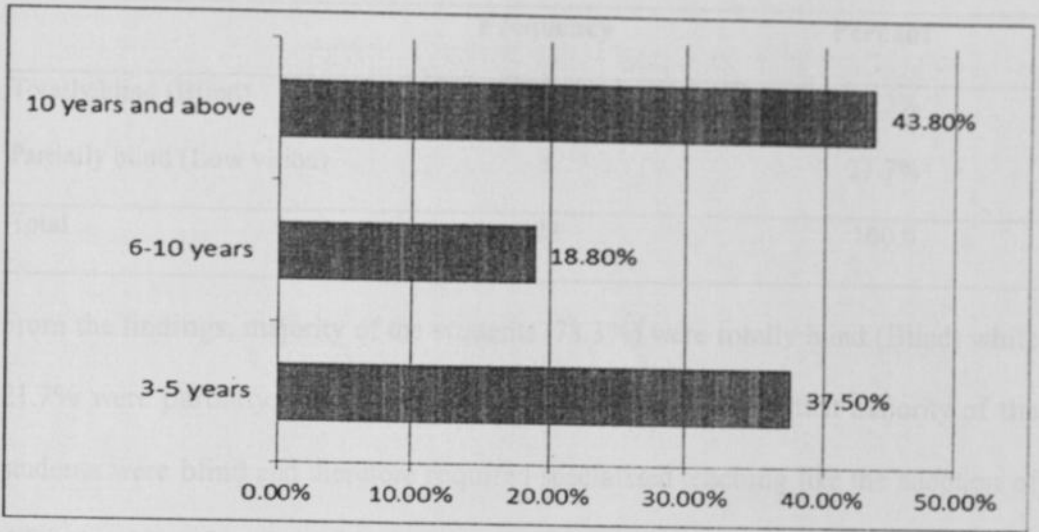


The findings established that majority of the teachers (68.8%) had bachelor's degree, 18.8% had master's degree while 12.5% were diploma holders. This illustrates that majority of the teachers were well trained in their profession owing to their high education background.

4.2.4 Teachers' duration of teaching experience in Teachers' College

The researcher also sought to find out the teachers' duration of teaching experience in Teachers' College. The findings are in Figure 6.

Figure 6: Teachers' duration of teaching experience in Teachers' College



The study finding in Figure 6 indicate that 43.8% of the teachers had been teaching for 10 years and above, 37.5% for 3-5 years while 18.8% had been teaching for 6-10 years. This depicts that that the majority of the staff had worked for long to give high quality information on the impact of assistive technology intervention on visually impaired students' performance in Kiswahili. It also depicts that they were well experienced in their job owing to their many years of experience while teaching.

4.2.5 Students' description of the state of their sight

The students were also to describe the state of their sight. The results were as tabulated in the Table 4.

Table 4: Students' description of the state of their sight

	Frequency	Percent
Totally blind (Blind)	18	78.3%
Partially blind (Low vision)	5	21.7%
Total	23	100.0

From the findings, majority of the students (78.3%) were totally blind (Blind) while 21.7% were partially blind (Low vision). The findings shows that majority of the students were blind and therefore required specialized teaching like the adoption of AT in teaching them to enable them perform well in their studies.

4.2.6 Students' response on the language they speak fluently

The students' were asked to indicate the language they spoke fluently. According to the findings, all the students (100%) unanimously agreed that the language that they spoke fluently was English.

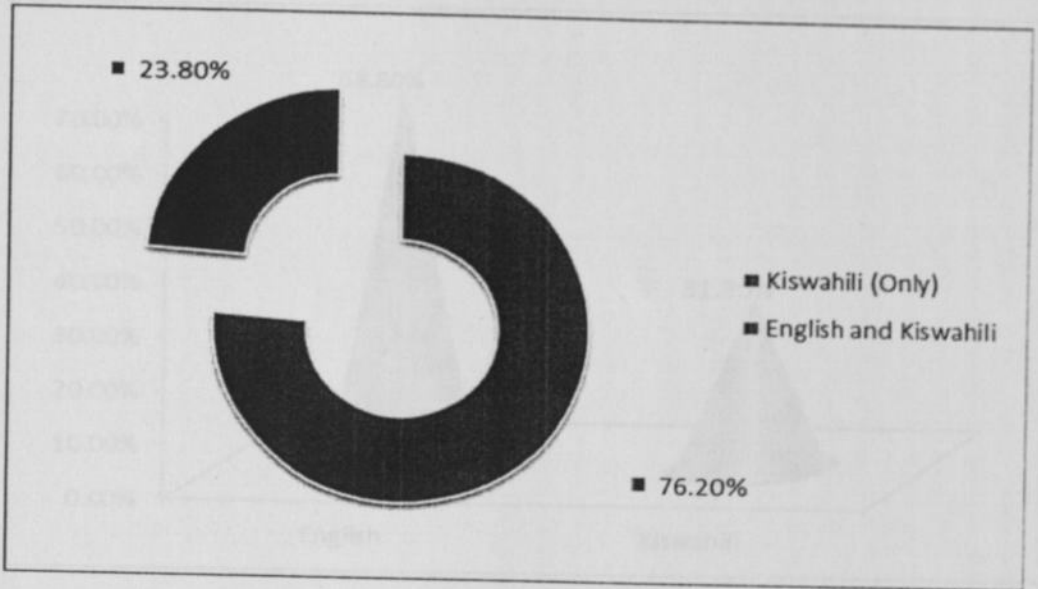
4.2.7 Students' response on language they commonly used in college

The students were further asked the language that they commonly used in college. According to the findings, all the students (100%) indicated that the language that they commonly used in college was English.

4.2.8 Students response on languages used in class when teaching /learning Kiswahili

The study sought to establish the languages used in class when teaching /learning Kiswahili and the findings are indicated in Figure 7.

Figure 7 Students response on languages used in class when teaching /learning Kiswahili

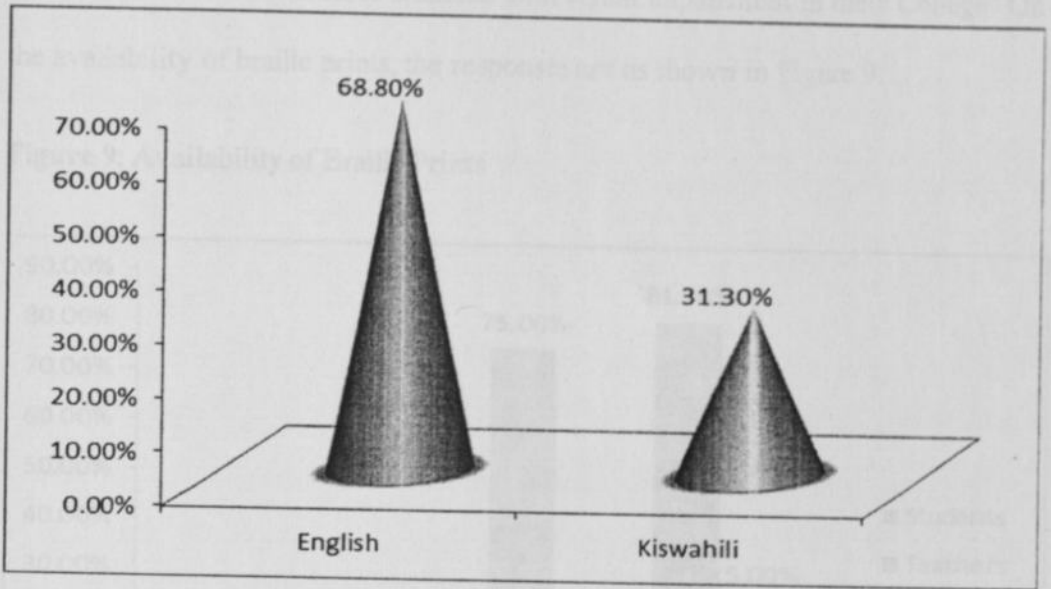


The study findings in Figure 7 indicated that majority of the students (76.2%) posited that the languages used in class when teaching/learning Kiswahili was Kiswahili (Only) while 23.8% attested that English and Kiswahili were used in class when teaching /learning Kiswahili. This illustrates that the Kiswahili language was a major language that was used in teaching VI students. Therefore assistive technology intervention could be adopted in teaching Kiswahili language and in showing the impact of assistive technology intervention on VI students' performance.

4.2.9 Teachers' response on the language that their students with visual impairment commonly used in college

The teachers were asked to indicate the language that their students with visual impairment commonly used in college. The results are as shown in Figure 8.

Figure 8: Teachers' response on the language that students commonly used in college



From Figure 8, majority (68.8%) of the teachers indicated that English was the language that their students with visual impairment commonly used in college. Only 31.3% of the teachers indicated that Kiswahili was the language that students with visual impairment commonly used in college.

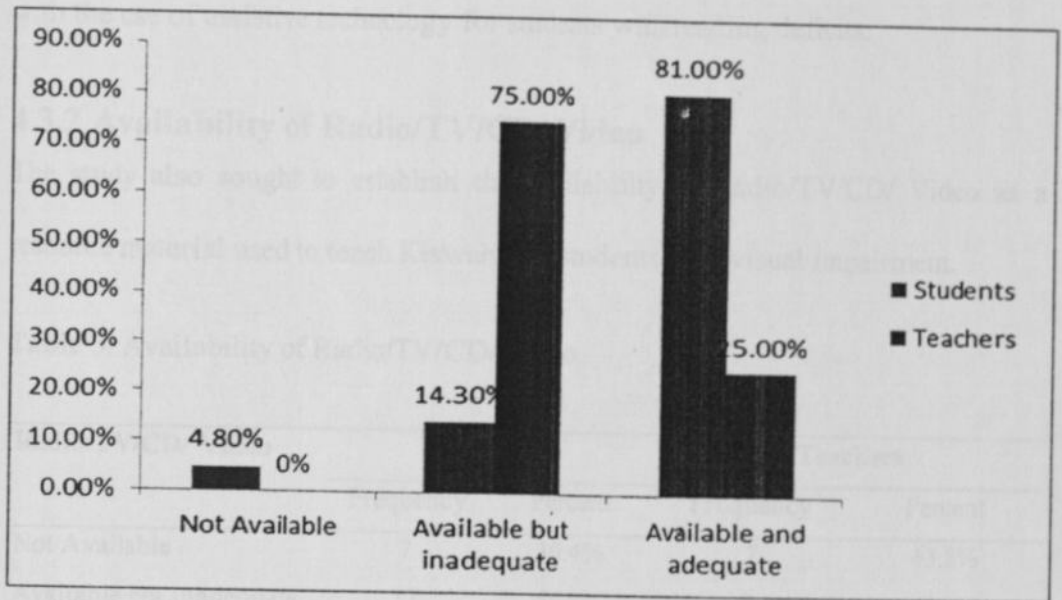
4.3 Use of assistive technology device in teaching and performance

The first objective of the study was to determine the impact of assistive technology device in teaching VI students and their performance in Kiswahili in Public Primary Teachers' Colleges. Digital voice recorder is one of the devices used in this study. The study findings are presented in the following subsections.

4.3.1 Availability of braille prints

The study initially inquired from the students' on the various resource materials that are used to teach Kiswahili to students with visual impairment in their College. On the availability of braille prints, the responses are as shown in Figure 9.

Figure 9: Availability of Braille Prints



According to the Figure 9, the majority of the students (81.0%) posited that the braille prints were available and adequate, 14.3% said that the braille prints were available but inadequate while 4.8% indicated that the braille prints were not available. Meanwhile the majority of the teachers (75.0%) posited that the braille prints were available but inadequate while 25.0% attested that the braille prints were available and adequate. This illustrates that the assistive technology devices were critical in teaching VI students in order to improve their performance in Kiswahili and therefore their adequacy in college determined the rate of students' performance. The braille prints as one of the assistive technology devices were

available in majority of colleges but were inadequate. According to the National Centre on Accessible Information Technology in Education, (2008) the AT devices would help the VI students to increase, maintain, or improve functional capabilities.

The findings concurs with (Balajthy, 2005; Boyle, Rosenberg, Connelly, Washburn, Brinckerhoff, & Banerjee, 2003) whose studies found positive outcomes associated with the use of assistive technology for students with reading deficits.

4.3.2 Availability of Radio/TV/CD/ Video

The study also sought to establish the availability of Radio/TV/CD/ Video as a resource material used to teach Kiswahili to students with visual impairment.

Table 5: Availability of Radio/TV/CD/ Video

Radio/TV/CD/ Video	Students		Teachers	
	Frequency	Percent	Frequency	Percent
Not Available	7	30.4%	7	43.8%
Available but inadequate	13	56.5%	8	50.0%
Available and adequate	3	13.0%	1	6.3%
Total	23	100.0	16	100.0

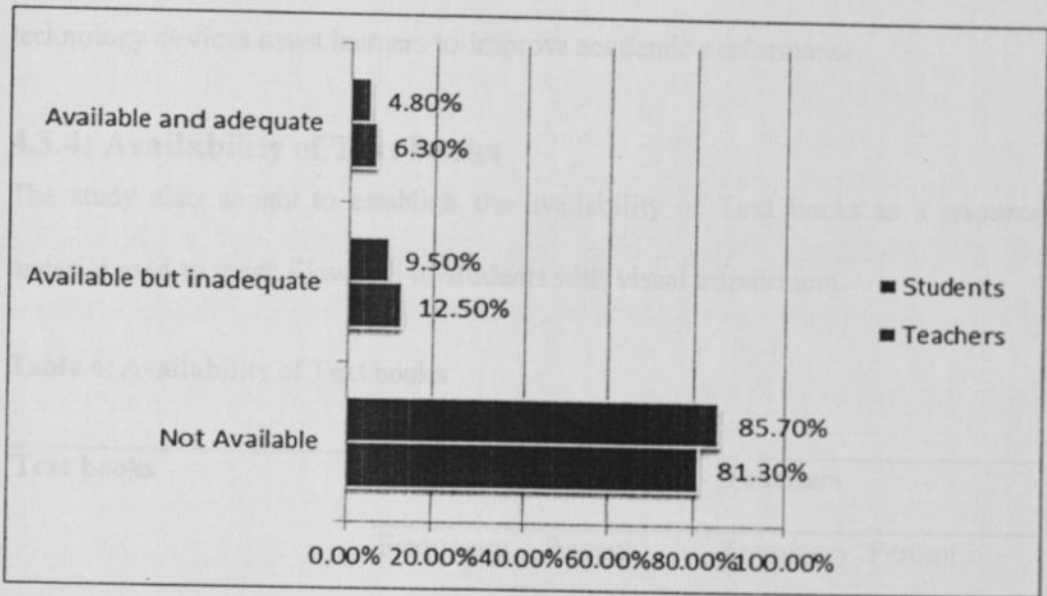
According to the Table 5, the majority of the students (56.5%) posited that the Radio/TV/CD/ Video were available but inadequate, 30.4% said that the Radio/TV/CD/ Video were not available while 13.0% indicated that the Radio/TV/CD/ Video were available and adequate. Meanwhile the majority of the teachers (50.0%) posited that the Radio/TV/CD/ Video were available but inadequate while 43.8% attested that the Radio/TV/CD/ Video were not available. This depicts that the colleges had shortage of assistive technology devices

(Radio/TV/CD/ Video) that would help them reach their full potential. Therefore the performance of the VI students was negatively affected by lack of assistive technology devices.

4.3.3 Availability of Magazines

The study also sought to establish the availability of magazines as a resource material used to teach Kiswahili to students with visual impairment.

Figure 10: Availability of Magazines



According to the Figure 10, the majority of the students (85.7%) posited that the magazines were not available, 9.5% said that the magazines were available but inadequate while 4.8% indicated that the magazines were available and adequate. Meanwhile the majority of the teachers (81.3%) posited that the magazines were not available, 12.5% said that they were available but inadequate while 6.3% attested that the magazines were available and adequate.

This illustrates that the students lacked reference materials to use as the colleges did not have magazines which is one of the AT materials for students use. This further point to the fact that the students missed out on up to date information in their area of study as the colleges never invested in written language technologies such as magazines. Thus the students performed dismally in their studies as they lacked adequate written language technologies and reading technologies. According to Hasselbring & Bausch (2006) and Copley & Ziviani, (2004) written language technologies, reading technologies and listening technologies by use of assistive technology devices assist learners to improve academic performance.

4.3.4: Availability of Text books

The study also sought to establish the availability of Text books as a resource material used to teach Kiswahili to students with visual impairment.

Table 6: Availability of Text books

Text books	Students		Teachers	
	Frequency	Percent	Frequency	Percent
Not Available	7	30.4%	10	62.5%
Available but inadequate	14	60.9%	5	31.3%
Available and adequate	2	8.7%	1	6.3%
Total	23	100.0	16	100.0

According to the Table 6, the majority of the students (60.9%) posited that the text books were available but inadequate, 30.4% reported that the text books were not available while 8.7% indicated that the text books were available and adequate.

Meanwhile the majority of the teachers (62.5%) posited that the text books were not available, 31.3% indicated that they were available but inadequate while only 6.3% of the teachers indicated that the text books available and adequate.

This illustrates that the students lacked adequate reading materials as VI students tend to be slow in learning as compared to the sighted students. The lack of adequate reading materials contributed to poor performance. This implies that use of assistive technology device in teaching VI students faced many challenges as the colleges did not have adequate reading materials.

The findings are collaborated with Joyce et al, (2004) & KISE, (1995) who found out that media facilitates the understanding of complicated concepts and ideas. They make learning a captivating and fulfilling experience. They make easier for learners to follow, understand, respond to and retain the content of the lesson. The lack of print material is a major drawback to VI students learning and negatively affects the performance.

4.3.5 Availability of talking books /Assistive technology

The study also sought to establish the availability of talking books/assistive technology as resource material used to teach Kiswahili to students with visual impairment.

Table 7: Availability of talking books /Assistive technology

Talkingbooks/assistive technology	Students		Teachers	
	Frequency	Percent	Frequenc	Percent
Not Available	10	43.5%	9	56.3%
Available but inadequate	13	56.5%	6	37.5%
Available and adequate	0	0	1	6.3%
Total	23	100.0	16	100.0

According to the Table 7, the majority of the students (56.5%) posited that the talking books /assistive technology were available but inadequate, while 43.5% said that the talking books /assistive technology were not available.

Meanwhile the majority of the teachers (56.3%) posited that the talking books /assistive technology were not available 37.5% indicated that they were available but inadequate while 6.3% attested that the talking books /assistive technology were available and adequate.

4.3.6 Availability of teaching/learning resources and performance in Kiswahili

The study inquired from the students on how the availability of teaching/learning resources affects performance in Kiswahili of students with visual impairment. According to the findings, the students indicated that lack of adequate teaching/learning resources resulted to poor performance in Kiswahili. The available teaching/learning resources enabled them to carry on further studies beyond what they were taught in class. Since the VI could not see the class

demonstration, the teaching/learning resources was the only way to enable them understand what they were taught by their teachers. The teaching/learning resources also enhanced the memory of the taught concepts as they had a chance to revise what they were taught by the teachers.

The college principals indicated that the teaching/learning resources were inadequate in their colleges and therefore the lack of adequate teaching/learning resources negatively affected the students learning process and led to poor performance.

From the observation on teaching/learning materials used to teach students with visual impairment, the researcher observed that the braille machines were used to teach the totally blind students. On the other hand, the colleges used large print materials (CCTV and enlarged print) in teaching the partially blind students. The colleges also had talking computers and radio cassettes for teaching the VI students.

The findings concurs with Kim et al., (2006) who argues that as teachers aim towards a goal of having all students provided with the same educational opportunities despite of their differences, there is need to include Assistive technology (AT) in the process of evaluation of a student's needs.

4.4 Use of assistive technology on VI students' severity and performance

The second objective of the study was to establish the impact of use of assistive technology on VI students' severity and their performance in Kiswahili in Public Primary Teachers' Colleges in Kenya. The study findings are presented in the following subsections.

4.4.1 Principals' response on relationship between the severity of VI students and their performance in Kiswahili

The study required the college principals to comment on the relationship between the severity of visually impaired students and their performance in the Kiswahili Language in PTE. According to the findings, the 3 principals unanimously agreed that the higher the severity of visually impaired students the poor their performance in Kiswahili Language. This depicts that visual impairment negatively affected the performance of students in colleges and therefore various interventions to reduce the effects of visual impairment would greatly help to enhance the performance of the VI students. It further implied that different levels of severity of visually impaired students required different assistive technology devices and methods to learn effectively. The findings concurs with Darling, (2010) who established that learners with low or partial sight are capable of coping with the demands of most classroom settings and apply their sense of vision in order to receive information to learn.

The findings are also in line with studies of Wallace, (2002); Wagner, (2002); & Thurlow, (2001) which compared the performance levels of VI students with the performance levels of students without disabilities, and found that the performance levels of VI students were lower than those of students without disabilities.

4.4.2 Comparing Tests result while using natural teaching methods and assistive technology

The study sought to analyse the treatment effect of using AT in teaching VI students in Machakos Teachers College while applying the natural teaching methods

on the control group in Mosoriot Teachers College. The students did a test whose total score was 30 marks.

Table 8: Mosoriot Teachers College Test Results (Control Group)

Control Group Which Used Natural Teaching Methods			
Impairment	Pre-test score	Post test score	Increase in Score
Totally blind	7	8	1
Totally blind	7	9	2
Totally blind	6	6	0
Totally blind	10	12	2
Totally blind	8	10	2
Totally blind	9	11	2
Totally blind	8	9	1
Impairment	Pretest score	Post test score	Increase in Score
Partially blind	6	12	6
Partially blind	9	11	2

As shown in Table 8, the study established that while using the natural teaching methods, majority (4 out of 7) of the totally blind students had an increase of 2 marks. In addition, 2 out of 7 totally blind students had an increase of 1 mark.

On the other hand, 1 out of 2 of the partially blind students had an increase of 6 marks while 1 out of 2 of the partially blind students had an increase of 2 marks while using natural teaching methods. This implies that different levels of VI severity performed differently when taught using natural teaching methods whereby the partially blind students performed better than totally blind students when taught with natural teaching methods. This is owing to the fact that the totally blind

students missed the untaught information that provides the basis for understanding key concepts. The findings are in line with Shepard, (2005) whose study indicated that the resulting gaps in concept development due to visual impairment can later affect their ability to infer, predict, comprehend, and create during learning activities thus affecting academic performance.

Impairment	Pre-test score	Post-test score	Increase in Score	Impairment	Pre-test score	Post-test score	Increase in Score
Totally blind	9	13	4	Totally blind	9	14	5
Totally blind	7	12	5	Totally blind	10	13	3
Totally blind	8	11	3	Totally blind	7	11	4
Totally blind	6	8	2	Totally blind	8	12	4
Totally blind	6	10	4				
Impairment	Pre-test score	Post-test score	Increase in Score	Impairment	Pre-test score	Post-test score	Increase in Score
Partially blind	7	12	5	Partially blind	8	10	2
Partially blind	3	11	8	Partially blind	6	8	2
				Partially blind	9	13	4

As illustrated in Table 9, the study established that while using the natural teaching methods, (2 out of 3) of the totally blind students had an increase of 4 marks while a single student had an increase of 5, 3, 3 mark respectively. On the other hand while using the natural teaching methods, (1 out of 3) of the partially blind students had

Table 9: Machakos Teachers College Test Results of both the Control and Experimental Groups.

Results of Control Group Which Used Natural Teaching Methods (7 Students)				Results of Experimental Group Which Used Assistive Technology(7Students)			
Impairment	Pretest score	Post test score	Increase in Score	Impairment	Pre test score	Post test score	Increase in Score
Totally blind	9	13	4	Totally blind	9	14	5
Totally blind	7	12	5	Totally blind	10	13	3
Totally blind	8	11	3	Totally blind	7	11	4
Totally blind	6	8	2	Totally blind	9	14	5
Totally blind	6	10	4				
Impairment	Pre-test score	Post test score	Increase in Score	Impairment	Post test	Pre-test	Increase in Score
Partially blind	7	12	5	Partially blind	8	10	2
Partially blind	8	11	3	Partially blind	6	8	2
				Partially blind	9	13	4

As illustrated in Table 9, the study established that while using the natural teaching methods, (2 out of 5) of the totally blind students had an increase of 4 marks while a single student had an increase of 5, 3, 2 mark respectively. On the other hand while using the natural teaching methods, (1 out of 2) of the partially blind students had

an increase of 5 marks while the other one had an increase of 3 marks. The findings shows that the partially blind students were better suited for the natural teaching methods than the totally blind students as they performed higher when taught using natural teaching methods. The findings also infer that an intervention in terms of assistive technology in teaching and learning for VI students is of great help to them in boosting their performance of Kiswahili.

Meanwhile while using the assistive technology as a teaching method, (2 out of 4) of the totally blind students had an increase of 5 marks while a single student had an increase of 4 and 3 respectively. On the other hand while using the assistive technology as a teaching method, (1 out of 3) of the partially blind students had an increase of 4 marks while 2 out of 4 students had an increase of 2 scores respectively. This depicts that assistive technology was a better method for teaching the totally blind students than the partially blind students as they performed better when taught using this method.

Noghoi, (2007) argues that it is important to identify the strengths and weaknesses of each of the teaching methods, and provide instruction in those that will be of greatest value for the visual impaired student to be given immediate and future needs.

4.5 Use of assistive technology on student-teacher related factors and performance

The third objective of the study was to determine the relationship between use of assistive technology on student-teacher related factors and performance of VI

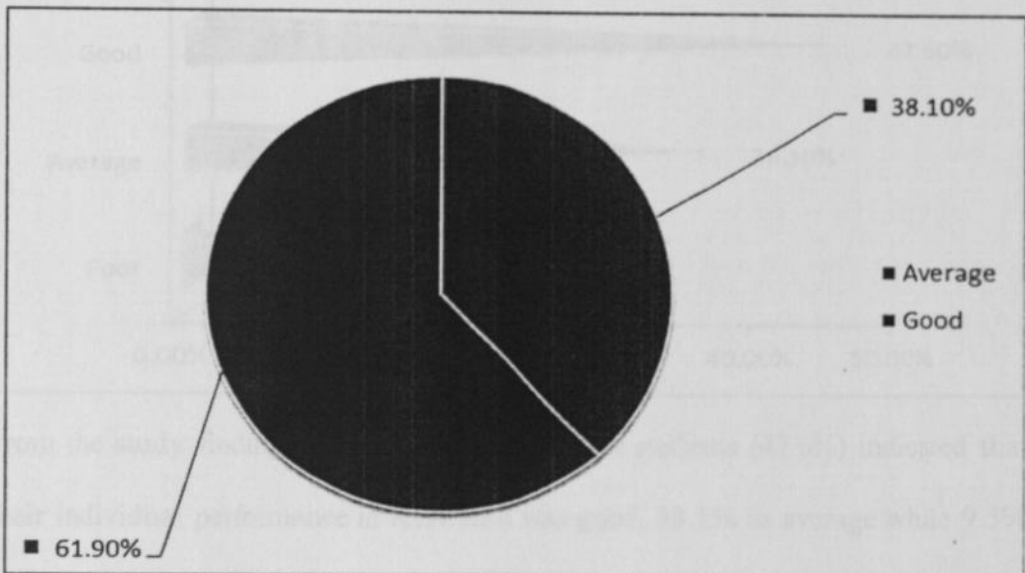
students in Kiswahili in Public Primary Teachers' Colleges in Kenya. The study findings are presented in the following subsections.

4.5.1 Students rating on performance of Kiswahili in college

The students were further required to rate performance of Kiswahili in their college.

The study findings are indicated in Figure 11.

Figure 11: Students rating on performance of Kiswahili in college



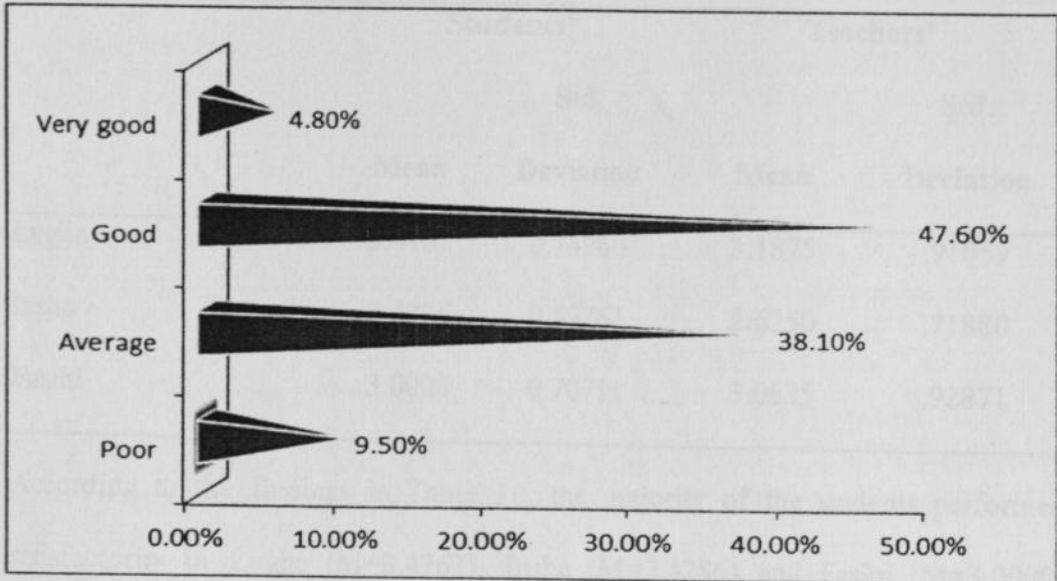
The study findings in Figure 11 show that majority of the students (61.9%) rated the students' performance of Kiswahili in college as good while 38.1% rated it as average. This depicts that the majority of the students performed well in Kiswahili and that the performance could be enhanced with the adoption of modern technology such as AT.

4.5.2 Students rating of their individual performance in Kiswahili

The students were also asked to rate their individual performance in Kiswahili.

Figure 12 illustrates the study findings.

Figure 12: Students rating of their individual performance in Kiswahili



From the study findings in Figure 12, most of the students (47.6%) indicated that their individual performance in Kiswahili was good, 38.1% as average while 9.5% rated it as poor. The findings shows that majority of the students performed well in their studies as their performance was beyond average despite their visual impairment challenges.

4.5.3 Performance of the visual impaired students in the various areas of Kiswahili Language

The students and the teachers were further requested to indicate how the visual impaired students performed in the various areas of Kiswahili Language. The responses were rated on a five point Likert scale where: 1- Very Poor, 2-Poor, 3-

Average, 4- Good, 5- Very Good. The mean and standard deviations were generated from SPSS and are as illustrated in Table 10.

Table 10: Students' response on how they performed in the following areas of Kiswahili Language

	Students'		Teachers'	
	Mean	Std. Deviation	Mean	Std. Deviation
Lugha	3.4762	0.74960	3.1875	.91059
Insha	3.4286	0.59761	2.6250	.71880
Fasihi	3.0000	0.70711	3.0625	.92871

According to the findings in Table 10, the majority of the students performed satisfactorily in Lugha (M=3.4762), Insha (M=3.4286) and Fasihi (M=3.0000) respectively.

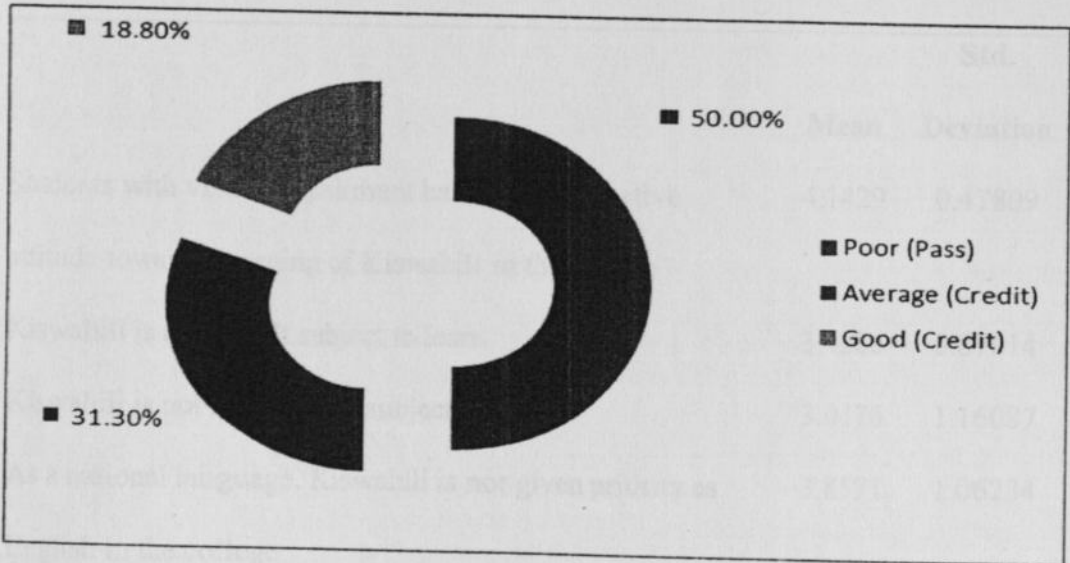
On the other hand, the majority of the teachers attested that the students performed satisfactorily in Lugha (M=3.1875), and Fasihi (M=3.0625) respectively. However the majority of the teachers attested that the students performed poorly in Insha as shown by a mean of (M=2.6250).

This shows that the VI students' performance was average as attested by both teachers and the students and therefore required to be enhanced through a hybrid of approaches of both natural methods of teaching and teaching assistive technology.

4.5.4 Teachers' rating the performance of Kiswahili of students with visual impairment in PTE examination

The teachers were required by the study to rate performance of Kiswahili of students with visual impairment in PTE examination.

Figure 13: Teachers' rating the performance of Kiswahili of students with visual impairment in PTE examination



The study findings indicate that majority of the teachers (50.0%) rated the performance of Kiswahili of students with visual impairment in PTE examination as poor (Pass), 31.3% rated the performance as average (Credit) while 18.8% rated the performance as good (Credit). This illustrates that the students were not fully poor as indicated by the teachers as they performed below average.

4.5.5 Students' response on teaching/learning items affecting Kiswahili and its performance of students with visual impairment

The students were requested to indicate their level of agreement on

teaching/learning items affecting Kiswahili and its performance of students with visual impairment. The responses were rated on a five point Likert scale where: 1 - Strongly Disagree 2 - Disagree 3 - Neutral 4- Agree and 5- Strongly Agree. Mean and standard deviations were generated from SPSS and are as illustrated in Table 11

Table 11: Students' response on teaching/learning items affecting Kiswahili and its performance of students with visual impairment

	Std.	
	Mean	Deviation
Students with visual impairment have a very negative attitude towards learning of Kiswahili in the college	4.1429	0.47809
Kiswahili is a difficult subject to learn	3.4286	0.87014
Kiswahili is not my favorite subject	3.0476	1.16087
As a national language, Kiswahili is not given priority as English in the college	3.8571	1.06234
It is difficult to understand Kiswahili teachers	1.4762	0.67964
Kiswahili teachers do not motivate students with visual impairment to learn Kiswahili	1.4286	0.59761

From the study findings in Table 11, majority of the students agreed that students with visual impairment have a very negative attitude towards learning of Kiswahili in the college as shown by a mean of 4.1429. In addition, majority of the students were neutral that as a national language, Kiswahili is not given priority as English

in the college ($M=3.8571$), Kiswahili is a difficult subject to learn ($M=3.4286$) and that Kiswahili is not their favorite subject ($M=3.0476$) respectively.

However, majority of the students strongly disagreed that it is difficult to understand Kiswahili teachers ($M=1.4762$) and that Kiswahili teachers do not motivate students with visual impairment to learn Kiswahili ($M=1.4286$) respectively.

This depicts that negative attitude towards learning of Kiswahili and the poor performance in Kiswahili by the VI students was attributed to students' negative attitude towards learning of Kiswahili, the lack of recognition and prioritization of Kiswahili as the national language in colleges, Kiswahili being a difficult subject to learn and Kiswahili not being the students most favorite subject and failure by the teachers to motivate students with visual impairment to learn Kiswahili.

4.5.6 Teachers' response on how various teaching/learning items affect Kiswahili performance of students with visual impairment in college

The study required the teachers to indicate how various teaching/learning items affected Kiswahili performance of students with visual impairment in college. The responses were rated on a five point Likert scale where: 1 - Strongly Disagree 2 - Disagree 3 - Neutral 4- Agree and 5- Strongly Agree. The mean and standard deviations were generated from SPSS and are as illustrated in Table 12.

Table 12: Teachers' response on how various teaching/learning items affect Kiswahili performance of students with visual impairment in college

	Mean	Std. Deviation
Students with visual impairment have a very negative attitude towards learning of Kiswahili poetry in college	3.2602	0.4375
Kiswahili is a difficult subject to learn for students with visual impairment	3.2501	0.2382
Kiswahili is not a favourite subject for students with visual impairment	3.0021	0.5055
As a national and official language, Kiswahili is not given priority as English in the college	3.3750	0.1474

From the study findings in table 12, majority of the teachers were neutral that as a national and official language, Kiswahili is not given priority as English in the college (M=3.3750), students with visual impairment have a very negative attitude towards learning of Kiswahili poetry in college (M=3.2602), Kiswahili is a difficult subject to learn for students with visual impairment (M=3.2501), Kiswahili is not a favorite subject for students with visual impairment (M=3.0021) respectively.

This reveals that Kiswahili Language was not treated with special attention as the national and official language which made the students put enough effort in learning. The students' negative attitude towards Kiswahili Language was a major student-teacher related factor leading to poor performance. Morgan (2003) in their study found that Zambian teachers were reluctant to include students with physical disabilities and visual impairment in academic activities. Where disability was

severe, teachers believed that the regular classroom was not an appropriate educational environment (Thompson et al., 2003).

4.5.7 The principals' opinion on the adequacy of Kiswahili teachers

The study also sought the opinion of the principals on the adequacy of Kiswahili teachers in their colleges. From the findings, the study established that the Kiswahili teachers were inadequate in the colleges surveyed which resulted into high teacher student ratio. This shows that the high teacher student ratio was a major student-teacher related factor that hindered better performance of the VI students.

4.5.8 The principals' opinion on the attitude of Kiswahili teachers in teaching visually impaired students

The study also required the principals to indicate their opinion on the attitude of Kiswahili teachers in teaching visually impaired students in their colleges. According to the findings, the study established that the attitude of the Kiswahili teachers in teaching visually impaired students was negative. The principals further explained that the teachers perceived the teaching of VI students as cumbersome as it required more comprehensive approach as compared to teaching the normal sighted students. The negative attitude of the teachers led to low levels of motivation among the teachers towards their teaching profession. Therefore the negative attitude, unpreparedness and lack of motivation were student-teacher related factors that led to poor performance of the students.

The study findings concurs with Cole & Chan, (2000) who pointed out that an attitude is a factor in one's daily living and therefore plays an important role in an

educator's daily interactions with students. Cole & Chan, (2000) further contended that the effects of teacher attitudes on the VI students could be serious. Teachers' judgments about VI students could have a significant influence on student's emotional, social and intellectual development. Therefore the educator's with negative attitude towards the VI students contributed to their poor performance.

4.5.9 The principals' response on challenges facing colleges in ensuring quality teaching of Kiswahili Language

The principals' were also requested to state some of the challenges their colleges in ensuring quality teaching of Kiswahili Language to students with visual impairment. According to the findings, the challenges in ensuring quality teaching of Kiswahili Language included the students' negative attitude towards languages, teachers' negative attitude towards special education, lack of adequate teaching and learning materials, lack of policy framework to establish Kiswahili as a national language, high teacher-students ratio and lack of adequate funds to cater for the needs of the VI students. The lack of modern facilities for teaching the VI students was also cited as a challenge. The principals' further pointed other challenges to include lack of specialized training among the teachers to handle the special needs of the VI students, lack of adequate AT devices and facilities.

The findings are collaborated by Agrawal, (2004) who posited that visually impaired students require modified school practices or special educational services in order to develop their full potential. Teachers need to be adequately prepared for delivery of special education to the visual impaired students. It is something special; special materials, special training techniques, special equipment and special help

and for special facilities may be required for special categories of students having special needs (Ivey and Broaddus, 2000; Hughes et al., 2007; Olsen et al., 2008).

4.6 Use of assistive teaching methods and performance

The fourth objective of the study was to establish the relationship between use of assistive teaching methods and performance of VI students in Kiswahili in Public Primary Teachers' Colleges in Kenya. The study findings are presented in the following subsections.

4.6.1 Teachers' response on the use of various teaching activities

The teachers were requested to indicate their use of various teaching activities. The responses were rated on a five point Likert scale where: 1 - Strongly Disagree 2 - Disagree 3 - Neutral 4- Agree and 5- Strongly Agree. The mean and standard deviations were generated from SPSS and are as illustrated in Table 13.

Table 13: Teachers' use of the various teaching activities

	Mean	Std. Deviation
Group work	3.7875	.87321
Discussion	4.0625	.77190
Peer consultations	3.6875	1.13835
Kiswahili clubs	2.2500	1.34164
Teacher Assistance Teams (TATs)	3.3125	1.19548

As shown in Table 13, the majority of the teachers agreed that the most significant teaching activities used while teaching Kiswahili were discussion (M=4.0625), group work (M=3.7875) and Peer consultations (M=3.6875) respectively. In

addition, other teaching activities used while teaching Kiswahili were teacher assistance teams (TATs) (M=3.3125) and Kiswahili clubs (M=2.2500) respectively.

This depicts that the colleges adopted different teaching methods and strategies to provide special education services to identified students with disabilities. The findings further infer that the participatory methods in teaching Kiswahili such as group discussion, group work and peer consultations were the most widely used methods of teaching Kiswahili in tertiary institutions.

Fuller, Healey, Bradley and Hall, (2004), assert that colleges use different teaching methods and strategies to provide special education services to identified students with disabilities. The methods of teaching the VI students such as lectures, discussion, assignment and handouts teaching methods are employed depending on the severity and availability of teaching materials

4.6.2 Methods teachers used to teach Kiswahili Language to students with visual impairment

The study also inquired from the students and teachers on the frequency of the methods used to teach Kiswahili Language to VI students. Their responses were rated on a five point Likert scale where: 1-Very Infrequent, 2- Infrequent, 3- Moderate, 4- Frequent, 5- Very frequent. The mean and standard deviations were generated from SPSS and are as illustrated in table 14.

Table 14: Methods teachers used to teach Kiswahili Language to students with visual impairment

	Students		Teachers	
	Mean	Std. Deviation	Mean	Std. Deviation
Lecture	4.7143	0.46291	4.8750	.34157
Group discussions	3.5714	0.81064	4.1250	1.02470
Debate	1.9048	0.76842	2.6250	.95743
Assignments	3.7143	0.95618	2.8750	1.02470
Handouts	2.5714	0.92582	2.0000	.96609

Table 14 shows that the majority of the students posited that the most significant methods that the teachers used to teach Kiswahili Language to students with visual impairment were: lectures (M=4.7143), assignments (M=3.7143) and group discussions (M=3.5714) respectively. The majority of the students further reported that the other significant methods that the teachers used to teach Kiswahili Language to students with visual impairment were: handouts (M=2.5714) and debate (M=1.9048) respectively.

The majority of the teachers attested that the most significant methods that they used to teach Kiswahili Language to students with visual impairment were: lecture (M=4.8750) and group discussions (M=4.1250) respectively. The majority of the teachers further attested that the other methods they used to teach Kiswahili Language to students with visual impairment were: assignments (M=2.8750), debate (M=2.6250) and handouts (M=2.0000) respectively.

From the observation on methods and strategies of teaching visually impaired students in public teachers' colleges in Kenya, the researcher observed that the lecturer method of teaching was the most commonly used teaching method. The discussion groups were also employed as methods and strategies of teaching visually impaired students. However, the assignments methods and handouts method were not commonly used as methods and strategies of teaching visually impaired students. The various teaching strategies being used in the colleges encourages students to think before attempting to solve problems and assist them to perform better academically.

In addition, the other strategies used for teaching visually impaired students included use of peer consultations between the VI students with sighted students, use of quieter rooms, teacher assistance teams, extended exam time for VI students and giving shorter assignments to the VI students. The colleges also had thermo phonic machines for duplicating braille papers.

The study findings concurs with Lang, 2005; Njogu, 2008; Cole & Chan, 2000; Alahmadi, 2007; 2003; Erin and Sumranveth, 1995; Weaver, 2003 and Frank, 2000; Krischer & Meissei, 2000; Lazarus et al.2006; Zimmer-Gembeck et al.2006 and Wagner et al.2002 who identified that the use of teaching strategies encourages students to think before attempting to solve problems and assist them to perform better academically. Such teaching strategies include adaptation of material(modification) in skipping subjects, simplified assignments, shorter assignments, extended time or adaptation of teaching material(accommodation) in listening to audio books, having someone to write notes, taking test in a quieter

room, academic rich programs, early intervention, clinical teaching, expert consultation and use of teacher assistance teams(TATs)in teaching VI students.

4.6.3 Role of the college administration in ensuring the teachers are prepared to teach Kiswahili Language to VI students

The study also asked the principals to explain the role of college administration in ensuring that the teachers are prepared to teach Kiswahili Language to students with visual impairment. The principals indicated that the college administration organizes sensitization programs to equip the teachers with necessary skills. The college administration also facilitates the teachers to attend training seminars to increase their knowledge and skills in their profession. On the other hand, the college administration motivates the teachers through incentives.

4.7 Inferential statistics

The study utilized t-test in testing the following hypotheses.

H₀₁ There is no significant relationship between use of assistive technology device in teaching VI students and their performance in Kiswahili in Public Primary Teachers' Colleges in Kenya.

H₀₂ There is no significant relationship between use of assistive technology on VI students' severity and their performance in Kiswahili in Public Primary Teachers Colleges.

H₀₃ There is no significant relationship between use of assistive technology on student- teacher related factors and performance of VI students in Kiswahili in Public Primary Teachers' Colleges in Kenya.

H₀₄ There is no significant relationship between use of assistive teaching methods and performance of VI students in Kiswahili language in Public Primary

4.7.1 Relationship between Assistive technology device in teaching VI students and performance in Kiswahili

The analysis first looked at the relationship between assistive technology device in teaching VI students and performance in Kiswahili. The following illustrates the statistical relationship between them.

Table 15: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Assistive technology device in teaching VI students	3.8900	19	4.53025	.45302
	Performance in Kiswahili	2.8100	19	.81271	.08127

Table 16: Paired Samples Correlations

Pair		N	Correlation	Sig.
1	Assistive technology device in teaching VI students & performance in Kiswahili	19	0.88	0

The results indicate that the parametric Pearson correlation or 'r' value is significant at .88 and the p-value (Sig) for the correlational coefficient is less than $p < .05$ and significant.

Table 17: Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Assistive technology device in teaching VI students - performance in Kiswahili	1.0800	4.53200	.45320	.18075	1.97925	2.383	19	.019

Results and Hypothesis Statement (Assistive technology device in teaching VI students and performance in Kiswahili)

There is a significant relationship between assistive technology device in teaching and performance in Kiswahili ($M = 3.9$; $M = 2.8$). However their respective standard deviations are 4.5 and .8 are very far apart statistically. Further the $t(19) = 2.383$, $p < .05$. Therefore we reject the null hypothesis that there is no relationship between assistive technology device in teaching and performance in Kiswahili and accept the alternative hypothesis that there is a relationship. Further with a 95% confidence interval from .18075 to 1.97925; the t-test statistic was 2.383 with 19 degrees of freedom and an associated P value = .019.

4.7.2 Relationship between use of assistive technology on VI students' severity and their performance in Kiswahili in Public Primary Teachers Colleges

The analysis also looked at the relationship between use of assistive technology on VI students' severity and performance in Kiswahili. The following illustrates the statistical relationship between them.

Table 18: Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 Assistive technology on VI students' severity	1.9145	17	1.28367	.11868
Performance in Kiswahili	2.7949	17	.84627	.07824

Table 19: Paired Samples Correlations

Pair	N	Correlation	Sig.
1 Assistive technology on VI students' severity & Performance in Kiswahili	17	0.72	0

The results indicate that the parametric Pearson correlation or 'r' value is significant at .72 and the p-value (Sig) for the correlational coefficient is less than $p < .05$ and is significant.

Table 20: Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
Pair					Lower	Upper			
1	Assistive technology on VI students' severity - performance in Kiswahili	-1.88034	1.21174	.11203	-1.10222	-.65846	-7.858	17	0.00

Results and Hypothesis Statement (assistive technology on VI students' severity / performance in Kiswahili)

There is a significant relationship between assistive technology on VI students' severity (M = 1.9, SD = 1.2) and performance in Kiswahili (M = 2.7, SD = .8); $t(17) = -7.858, p > .05$ and is not significant. Therefore we reject the null hypothesis that there is no relationship between use of assistive technology on VI students' severity and their performance in Kiswahili in Public Primary Teachers Colleges and accept the alternative hypothesis that there is a relationship. Further with a 95% confidence interval from -1.10222 to -6.5846; the t-test statistic was -7.857 with 17 degrees of freedom and an associated P value = 0.00.

4.7.3 Relationship between uses of assistive technology on student-teacher related factors and performance of VI students in Kiswahili in Public Primary Teachers' Colleges in Kenya.

The analysis looked at the relationship use of assistive technology on student-teacher related factors and performance of VI students in Kiswahili. The following illustrates the statistical relationship between them.

Table 21: Paired Samples Statistics

	Mean	N	Std. Deviation	Std. Error Mean
Pair 1 use of assistive technology on student-teacher related factors	1.7407	15	1.50619	.14493
performance of VI students in Kiswahili	2.7685	15	.83841	.08068

Table 22: Paired Samples Correlations

	N	Correlation	Sig.
Pair 1 use of assistive technology on student- teacher related factors & performance of VI students in Kiswahili	15	0.74	0.002

The results indicate that the parametric Pearson correlation or 'r' value is significant at .74 and the p-value (Sig) for the correlational coefficient is less than $p < .05$ and significant.

Table 23: Paired Samples Test

Pair		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
1	use of assistive technology on student- teacher related factors - Performance of VI students in Kiswahili	-1.027	1.84674	.17770	-1.38005	-.67550	-5.784	15	.000

Results and Hypothesis Statement (use of assistive technology on student-teacher related factors and performance in Kiswahili)

There is a significant relationship between use of assistive technology on student-teacher related factors ($M = 1.7$, $SD = 1.5$) and the performance of VI students in Kiswahili ($M = 2.7$, $SD = .8$); $t(15) = -5.784$, $p < .05$ and is significant. Therefore we reject the null hypothesis that there is no relationship between students- teacher related factors and performance of VI students in Kiswahili and accept the alternative hypothesis that there is a relationship. Further with a 95% confidence interval from -1.38005 to -.67550; the t-test statistic was -5.784 with 15 degrees of freedom and an associated P value = .000.

4.7.4 Relationship between use of assistive teaching methods and performance of VI students in Kiswahili language in Public Primary Teachers' Colleges.

The analysis next looked at the relationship between assistive teaching methods and

performance of VI students in Kiswahili. The following illustrates the statistical relationship between them.

Table 24: Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Assistive teaching methods	2.3483	14	1.88355	.19966
	Performance of VI students in Kiswahili	2.8315	14	.81514	.08640

Table 25: Paired Samples Correlations

Pair		N	Correlation	Sig.
1	Assistive teaching methods & Performance of VI students in Kiswahili	14	0.54	0.00

The results indicate that the parametric Pearson correlation or 'r' value is significant at .54 and the p-value (Sig) for the correlational coefficient is less than $p < .05$ and significant.

Table 26: Paired Samples Test

		Paired Differences							
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Lower	Upper			
Pair 1	Assistive teaching methods - performance of VI students in Kiswahili	-.4832	2.16434	.22942	-.93907	-.02722	-2.106	14	.038

Results and Hypothesis Statement (Assistive teaching methods - performance of VI students in Kiswahili)

There is a significant relationship between assistive teaching methods ($M = 2.3$, $SD = 1.8$) and the performance of VI students in Kiswahili ($M = 2.8$, $SD = .8$); $t(14) = -2.106$, $p < .05$ and is significant. Therefore we reject the null hypothesis that there is no relationship between assistive teaching methods and Performance of VI students in Kiswahili and accept the alternative hypothesis that there is a relationship. Further with a 95% confidence interval from $-.93907$ to $-.02722$; the t-test statistic was -2.106 with 14 degrees of freedom and an associated P value = $.038$.

4.8 Discussion of Findings

The findings of this study are discussed in line with the research objective.

4.8.1 Impact of use of assistive technology device in teaching VI students and their performance in Kiswahili

The findings show that the braille prints were available and adequate. The assistive technology devices were critical in teaching VI students in order to improve their performance in Kiswahili and therefore their adequacy in college determined the rate of students' performance. The braille prints as one of the assistive technology devices were available in majority of colleges but were inadequate. The Radio/TV/CD/ Video were available but inadequate and therefore the colleges had shortage of assistive technology devices (Radio/TV/CD/ Video) that would help them reach their full potential. Therefore the performance of the VI students was negatively affected by lack of assistive technology devices.

The findings of the study agreed with The National Centre on Accessible Information Technology in Education, (2008) found out that Assistive Technology (AT) is any item, piece of equipment, or system, whether acquired commercially, modified, or customized, that is commonly used to increase, maintain, or improve functional capabilities of individuals with disabilities. Balajthy, (2005) also cited that AT can provide support for students who struggle with reading regardless of the cause. Studies have found positive outcomes associated with the use of assistive technology for students with reading deficits. Kim, et al., (2006) also argued that as teachers aim towards a goal of having all students provided with the same educational opportunities despite of their differences, there is need to include

Assistive technology (AT) in the process of evaluation of a student's needs.

Cowen & Shepler, (2000); Corn et al., (2002); Van Bon et al., (2004) further found out that the reading speeds of students who use Braille tend to be slower than those of students who use print and those of students with low vision who use magnification devices. They also found out that VI students tend to be slow in learning as compared to the sighted students in reading. Van Bon et al., (2004) and Corn et al., (2004) highlights the importance of the availability of material and human resources for teaching of VI students. It is important to determine the most appropriate reading medium for each VI student. Nkuuhe, 1995; Ayot and Patel 1997 further comments that words alone are liable to distortion. Media facilitates the understanding of complicated concepts and ideas. They make learning a captivating and fulfilling experience. They make easier for learners to follow, understand, respond to and retain the content of the lesson as reflected by (Joyce et al, 2004; KISE, 1995).

4.8.2 Impact of use of assistive technology on VI students' severity and their performance in Kiswahili

The findings shows that assistive technology intervention could be adopted in teaching Kiswahili language and in showing the impact of assistive technology intervention on VI students' performance. The findings of the study agreed with Kim, et al., (2006) who argues that as teachers aim towards a goal of having all students provided with the same educational opportunities despite of their differences, there is need to include Assistive technology (AT) in the process of evaluation of a student's needs. AT can assist learners to improve their academic

performance. Copley & Ziviani, (2004); Jones, Valdez, Nowakowski & Rasmussen, (1995) found out that many times, these students rely on parents, siblings, friends and teachers for help. Cost or lack of funding is a barrier mentioned in virtually all the research on the implementation of assistive technology, especially in regards to students with mild disabilities and an intervention can be done in teaching Kiswahili to visually impaired students by use of assistive technology.

Noghoi, (2007) and Koenig, (2003) agreed that it is important to identify the strengths and weaknesses of each, and provide instruction in those that will be of greatest value for the visual impaired student to be given immediate and future needs and further argues that students who are blind or visually impaired simply face a barrier to accessing print. An intervention in teaching and learning for VI students will be of great help to them thus boosting performance of Kiswahili.

4.8.3 Relationship between uses of assistive technology on student-teacher related factors and performance of VI students in Kiswahili

The study found out that the attitude of the Kiswahili teachers in teaching visually impaired students was positive but the challenges in ensuring quality teaching of Kiswahili Language included the students having a negative attitude towards languages, teachers have a negative attitude towards their career and lack of adequate teaching and learning materials.

The findings of the study agreed with Cole & Chan, (2000) who contended that the effects of teacher attitudes on the VI students could be serious. Teachers' judgments about VI students could have a significant influence on student's emotional, social

and intellectual development. Agrawal, (2004) argued that visually impaired students require modified school practices or special educational services in order to develop their full potential and that teachers need to be adequately prepared for delivery of special education to the visual impaired students. It is something special; special materials, special training techniques, special equipment and special help and for special facilities may be required for special categories of students having special needs.

4.8.4 Relationship between use of assistive teaching methods and performance of VI students in Kiswahili

The study found out that the most significant methods that the teachers used to teach Kiswahili Language to students with visual impairment were: lectures, assignments and group discussions. The study also found out that other strategies used for teaching visually impaired students included use of peer consultations between the VI students with sighted students, use of quieter rooms, teacher assistance teams, extended exam time for VI students and giving shorter assignments to the VI students. The study further found out that college administration organizes sensitization programs to equip the teachers with necessary skills and also facilitated the teachers to attend training seminars to increase their knowledge and skills in their profession. On the other hand, the college administration motivates the teachers through incentives.

The findings of the study agreed with Fuller, Healey, Bradley and Hall, (2004) who assert that colleges use different teaching methods and strategies to provide special education services to identified students with disabilities. These methods can be

broadly grouped into inclusion, mainstreaming, segregation and exclusion. Klein and Merritt (2004) also agreed that a constructivist teaching approach leads to improved student achievement because it develops critical thinking, interpretation and analytical skills.

Holbrook, 2003; Erin and Sumranveth, 1995; Weaver, 2003 and Frank, 2000; Krischer & Meissen, 2000; Lazarus et al., 2006; Zimmer-Gembeck et al., 2006 and Wagner et al. 2002; also suggests that use of teaching strategies encourages students to think before attempting to solve problems and assist them to perform better academically. Such teaching strategies include adaptation of material (modification) in skipping subjects, simplified assignments, shorter assignments, extended time or adaptation of teaching material (accommodation) in listening to audio books, having someone to write notes, taking test in a quieter room, academic rich programs, early intervention, clinical teaching, expert consultation and use of teacher assistance teams (TATs) in teaching VI students. These intervention strategies can improve performance.

CHAPTER FIVE:

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents conclusions and recommendations on this study which assessed the impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary Teachers' Colleges in Kenya.

5.2 Summary

The study established that majority of the VI students' performance in Kiswahili was average. The majority of the VI students performed fairly in Kiswahili and that they had a great potential to improve their performance with the adoption of modern teaching technologies in their colleges such as AT. The majority of the students performed satisfactorily in Lugha (M=3.4762), Insha (M=3.4286) and Fasihi (M=3.0000) respectively. The VI students' performance was average as attested by both teachers and the students and therefore required to be enhanced through a hybrid of approaches of both natural methods of teaching and teaching using assistive technology to realize their full potential in learning.

The study found out that according to majority of the students, VI students have a very negative attitude towards learning of Kiswahili in the college, as a national language, Kiswahili is not given priority as English in the college, Kiswahili is a difficult subject to learn and that Kiswahili is not their favorite subject respectively.

Therefore the poor performance in Kiswahili by the VI students was attributed to students' negative attitude towards learning of Kiswahili, the lack of recognition and prioritization of Kiswahili as the national language in colleges, Kiswahili being a difficult subject to learn and Kiswahili not being the students' most favorite subject and failure by the teachers to motivate students with visual impairment to learn Kiswahili.

The study established that majority of the teachers were neutral that as a national and official language, Kiswahili is not given priority as English in the college, students with visual impairment have a very negative attitude towards learning of Kiswahili poetry in college, Kiswahili is a difficult subject to learn for students with visual impairment, Kiswahili is not a favourite subject for students with visual impairment respectively. This reveals that the Kiswahili Language was not treated with special attention as the national and official language which made the students put enough effort in learning. The students' negative attitude towards the Kiswahili Language was a major student-teacher related factor leading to poor performance.

The study further found out that the Kiswahili teachers were inadequate in the colleges surveyed which resulted into high teacher-student ratio. The high teacher student ratio was a major student-teacher related factor that hindered better performance of the VI students.

On the attitude of Kiswahili teachers in teaching VI students the study established that the attitude of the Kiswahili teachers in teaching visually impaired students was negative. The teachers perceived the teaching of VI students as cumbersome as it

required more comprehensive approach as compared to teaching the normal sighted students. The negative attitude of the teachers led to low levels of motivation among the teachers towards their teaching profession. Therefore the negative attitude of the teachers, unpreparedness and the lack of motivations were student-teacher related factors that led to poor performance of the students.

The study also established that the challenges in ensuring quality teaching of Kiswahili Language to students with visual impairment included the students' negative attitude towards languages, teachers' negative attitude towards special education, lack of adequate teaching and learning materials, lack of policy framework to establish Kiswahili as a national language, high teacher-students ratio and lack of adequate funds to cater for the needs of the VI students. The lack of modern facilities for teaching the VI students was also cited as a challenge. The principals further pointed other challenges to include lack of specialized training among the teachers to handle the special needs of the VI students, lack of adequate AT devices and facilities.

The study established that the higher the severity of VI students the poor their performance in the Kiswahili Language. The visual impairment negatively affected the performance of students in colleges and therefore various interventions to reduce the effects of visual impairment would greatly help to enhance the performance of the VI students. It further implied that different levels of severity of visually impaired students required different assistive technology devices and methods to learn effectively.

The study established that while using the natural teaching methods, majority (4 out of 7) of the totally blind students had an increase of 2 marks. In addition, 2 out of 7 totally blind students had an increase of 1 mark. This implies that different levels of VI severity performed differently when taught using natural teaching methods whereby the partially blind students performed better than totally blind students when taught using natural teaching methods. This is owing to the fact that the totally blind students missed the untaught information that provides the basis for understanding key concepts.

The study established that while using the natural teaching methods, most of the totally blind students had a slight increase in performance while majority of the partially blind students had high increase in performance. The findings inferred that the partially blind students were better suited for the natural teaching methods than the totally blind students as they performed higher when taught using natural teaching methods. The findings also inferred that an intervention in terms of assistive technology in teaching and learning for VI students is of great help to them in boosting their performance of Kiswahili.

The study established that while using the assistive technology as a teaching method, majority of the totally blind students had a high increase in performance while the partially blind students had slight increase in performance. Therefore the assistive technology was a better method for teaching the totally blind students than the partially blind students as they performed better when taught using this method.

The study further revealed that the braille prints were available and adequate. The

assistive technology devices were critical in teaching VI students in order to improve their performance in the Kiswahili and therefore their adequacy in college determined the rate of students' performance. The braille prints as one of the assistive technology devices were available in majority of colleges but were inadequate.

The Radio/TV/CD/ Video were available but inadequate and therefore the colleges had shortage of assistive technology devices (Radio/TV/CD/ Video) that would help them reach their full potential. Therefore the performance of the VI students was negatively affected by lack of assistive technology devices.

The students lacked reference materials to use as the colleges did not have magazines which is one of the AT materials for students use. This further point to the fact that the students missed out on up to date information in their area of study as the colleges never invested in written language technologies such as magazines. Thus the students performed dismally in their studies as they lacked adequate written language technologies and reading technologies.

The text books were available but inadequate, and therefore the students lacked adequate reading materials as VI students tend to be slow in learning as compared to the sighted students. The lack of adequate reading materials contributed to poor performance. This implies that use of assistive technology device in teaching VI students faced many challenges as the colleges did not have adequate reading materials.

The talking books /assistive technology were available but inadequate. According to

the findings, the lack of adequate teaching/learning resources resulted to poor performance in Kiswahili. The available teaching/learning resources enabled them to carry on further studies beyond what they were taught in class. Since the VI could not see the class demonstration, the teaching/learning resources was the only way to enable them understand what they were taught by their teachers. The teaching/learning resources also enhanced the memory of the taught concepts as they had a chance to revise what they were taught by the teachers.

The study established that the teaching/learning resources were inadequate in their colleges and therefore the lack of adequate teaching/learning resources negatively affected the students learning process and led to poor performance. The study established that the braille machines were used to teach the totally blind students. On the other hand, the colleges used large print materials (CCTV and enlarged print) in teaching the partially blind students. The colleges also had talking computers and radio cassettes for teaching the VI students.

The study further found out that the most significant teaching activities used while teaching the Kiswahili language were discussion, group work and peer consultations respectively. In addition, other teaching activities used while teaching Kiswahili were teacher assistance teams (TATs) and Kiswahili clubs respectively. Therefore the colleges adopted different teaching methods and strategies to provide special education services to identified students with disabilities. The finding further infers that the participatory methods in teaching Kiswahili such as group discussion, group work and peer consultations were the most widely used methods of teaching Kiswahili in tertiary institutions.

The study also established that the most significant methods that the teachers used to teach the Kiswahili Language to students with visual impairment were: lectures, assignments and group discussions respectively. The other significant methods that the teachers used to teach Kiswahili Language to students with visual impairment were: handouts and debate respectively.

In addition, the other strategies used for teaching visually impaired students included use of peer consultations between the VI students with sighted students, use of quieter rooms, teacher assistance teams, extended exam time for VI students and giving shorter assignments to the VI students. The colleges also had thermo phonic machines for duplicating braille papers. The study also established that the college administration organizes sensitization programs to equip the teachers with necessary skills. The college administration also facilitates the teachers to attend training seminars to increase their knowledge and skills in their profession. On the other hand, the college administration motivates the teachers through incentives.

5.3 Conclusions

The study concluded that majority of the VI students' performance in Kiswahili was average. The majority of the VI students performed fairly in Kiswahili and that they had a great potential to improve their performance with the adoption of modern teaching technologies in their colleges such as AT. The majority of the students performed satisfactorily in Lugha, Insha and Fasihi respectively. The VI students' performance was average as attested by both teachers and the students and therefore required to be enhanced through a hybrid of approaches of both natural methods of

teaching and teaching using assistive technology to realize their full potential in learning.

The study concluded that VI students have a very negative attitude towards learning of Kiswahili in the college, as a national language, Kiswahili is not given priority as English in the college, Kiswahili is a difficult subject to learn and that Kiswahili is not their favorite subject respectively. Therefore the poor performance in Kiswahili by the VI students was attributed to students' negative attitude towards learning of Kiswahili, the lack of recognition and prioritization of Kiswahili as the national language in colleges, Kiswahili being a difficult subject to learn and Kiswahili not being the students most favorite subject and failure by the teachers to motivate students with visual impairment to learn Kiswahili.

The study concluded that as a national and official language, Kiswahili is not given priority as English in the college, students with visual impairment have a very negative attitude towards learning of Kiswahili poetry in college, Kiswahili is a difficult subject to learn for students with visual impairment, Kiswahili is not a favourite subject for students with visual impairment respectively. Therefore the Kiswahili Language was not treated with special attention as the national and official language which made the students put enough effort in learning. The students' negative attitude towards the Kiswahili Language was a major student-teacher related factor leading to poor performance.

The study further concluded that the Kiswahili teachers were inadequate in the colleges surveyed which resulted into high teacher-student ratio. The high teacher

student ratio was a major student-teacher related factor that hindered better performance of the VI students. On the attitude of Kiswahili teachers in teaching VI students the study concluded that the attitude of the Kiswahili teachers in teaching visually impaired students was negative. The teachers perceived the teaching of VI students as cumbersome as it required more comprehensive approach as compared to teaching the normal sighted students. The negative attitude of the teachers led to low levels of motivation among the teachers towards their teaching profession. Therefore the negative attitude of the teachers and the lack of motivations were student-teacher related factors that led to poor performance of the students.

The study also concluded that the challenges in ensuring quality teaching of Kiswahili Language to students with visual impairment included the students' negative attitude towards languages, teachers' negative attitude towards special education, lack of adequate teaching and learning materials, lack of policy framework to establish Kiswahili as a national language, high teacher-students ratio and lack of adequate funds to cater for the needs of the VI students. The lack of modern facilities for teaching the VI students was also cited as a challenge. The principals' further pointed other challenges to include lack of specialized training among the teachers to handle the special needs of the VI students, lack of adequate AT devices and facilities.

The study concluded that the higher the severity of VI students the poor their performance in Kiswahili Language. The visual impairment negatively affected the performance of students in colleges and therefore various interventions to reduce the effects of visual impairment would greatly help to enhance the performance of

the VI students. It further implied that different levels of severity of visually impaired students required different assistive technology devices and methods to learn effectively.

The study concluded that while using the natural teaching methods, majority (4 out of 7) of the totally blind students had an increase of 2 marks. In addition, 2 out of 7 totally blind students had an increase of 1 mark. This implies that different levels of VI severity performed differently when taught using natural teaching methods whereby the partially blind students performed better than totally blind students when taught with natural teaching methods. This is owing to the fact that the totally blind students missed the untaught information that provides the basis for understanding key concepts.

The study concluded that while using the natural teaching methods, most of the totally blind students had a slight increase in performance while majority of the partially blind students had high increase in performance. The findings inferred that the partially blind students were better suited for the natural teaching methods than the totally blind students as they performed higher when taught using natural teaching methods. The findings also inferred that an intervention in terms of assistive technology like use of digital voice recorder in teaching and learning for VI students is of great help to them in boosting their performance of Kiswahili.

The study concluded that while using the assistive technology as a teaching method, majority of the totally blind students had a high increase in performance while of the partially blind students had slight increase in performance. Therefore the

assistive technology was a better method for teaching the totally blind students than the partially blind students as they performed better when taught using this method.

The study further concluded that the braille prints were available and adequate. The assistive technology devices were critical in teaching VI students in order to improve their performance in Kiswahili and therefore their adequacy in college determined the rate of students' performance. The braille prints as one of the assistive technology devices were available in majority of colleges but were inadequate. The Radio/TV/CD/ Video were available but inadequate and therefore the colleges had shortage of assistive technology devices (Radio/TV/CD/ Video) that would help them reach their full potential. Therefore the performance of the VI students was negatively affected by lack of assistive technology devices.

The students lacked reference materials to use as the colleges did not have magazines which is one of the AT materials for students use. This further point to the fact that the students missed out on up to date information in their area of study as the colleges never invested in written language technologies such as magazines. Thus the students performed dismally in their studies as they lacked adequate written language technologies and reading technologies. The text books were available but inadequate, and therefore the students lacked adequate reading materials as VI students tend to be slow in learning as compared to the sighted students. The lack of adequate reading materials contributed to poor performance. This implies that use of assistive technology device in teaching VI students faced many challenges as the colleges did not have adequate reading materials.

The talking books /assistive technology were available but inadequate. According to the findings, the lack of adequate teaching/learning resources resulted to poor performance in Kiswahili. The available teaching/learning resources enabled them to carry on further studies beyond what they were taught in class. Since the VI could not see the class demonstration, the teaching/learning resources was the only way to enable them understand what they were taught by their teachers. The teaching/learning resources also enhanced the memory of the taught concepts as they had a chance to revise what they were taught by the teachers.

The study concluded that the teaching/learning resources were inadequate in their colleges and therefore the lack of adequate teaching/learning resources negatively affected the students learning process and led to poor performance. The study established that the braille machines were used to teach the totally blind students. On the other hand, the colleges used large print materials (CCTV and enlarged print) in teaching the partially blind students. The colleges also had talking computers and radio cassettes for teaching the VI students.

The study further concluded that the most significant teaching activities used while teaching Kiswahili were discussion, group work and peer consultations respectively. In addition, other teaching activities used while teaching Kiswahili were teacher assistance teams (TATs) and Kiswahili clubs respectively. Therefore the colleges adopted different teaching methods and strategies to provide special education services to identified students with disabilities. The finding further infers that the participatory methods in teaching Kiswahili such as group discussion, group work and peer consultations were the most widely used methods of teaching

Kiswahili in tertiary institutions.

The study also concluded that the most significant methods that the teachers used to teach Kiswahili Language to students with visual impairment were: lectures, assignments and group discussions respectively. The other significant methods that the teachers used to teach Kiswahili Language to students with visual impairment were: handouts and debate respectively.

In addition, the other strategies used for teaching visually impaired students included use of peer consultations between the VI students with sighted students, use of quieter rooms, teacher assistance teams, extended exam time for VI students and giving shorter assignments to the VI students. The colleges also had thermo phonic machines for duplicating braille papers. The study also established that the college administration organizes sensitization programs to equip the teachers with necessary skills. The college administration also facilitates the teachers to attend training seminars to increase their knowledge and skills in their profession. On the other hand, the college administration motivates the teachers through incentives.

5.4 Recommendations

The study recommends that the management of tertiary institutions should invest on interventions like the assistive technology in enhancing their academic performance. The study further recommends that VI students be provided with specialized teaching like the adoption of AT in teaching them to enable them perform well in their studies. The study also recommends Kiswahili be the language that VI students use in college since students performed well in Kiswahili and this

performance could be enhanced with adoption of modern technology such as AT.

Despite the fact that majority of the students performed satisfactorily in Lugha, Insha and Fasihi, the study recommends that both teachers and the students should be enhanced through a hybrid of approaches of both natural methods of teaching and teaching assistive technology since the students were not fully poor as indicated by the teachers. Students with visual impairment have a very negative attitude towards learning of Kiswahili in the college and as a national language, Kiswahili is not given priority as English in the college, Kiswahili is a difficult subject to learn and Kiswahili is not the Students favorite subject. However, the study recommends that Kiswahili teachers should motivate students with visual impairment to learn Kiswahili, as a national language, Kiswahili should be given priority as English in the college; students should understand Kiswahili teachers and they should also make Kiswahili their favorite subject.

The most significant teaching activities used while teaching Kiswahili were discussion, group work and Peer consultations. However, the study recommends that other teaching activities like Kiswahili clubs and Teacher Assistance Teams (TATs) to be used to achieve higher performance in Kiswahili. The study further recommends that various interventions to reduce the effects of visual impairment would greatly help to enhance the performance of the VI students.

Further, the study recommends that the braille prints, /TV/CD/ Video, text books and magazines be made available and adequate. The study also recommends that Braille machines, CCTVs, thermophonic machines, embossers, the talking books

/assistive technology be made available and adequate. The study further recommends that students should carry on their studies beyond what they were taught in class, since teaching/learning resources enhanced the memory of the taught concepts as they had a chance to revise what they were taught by the teachers. Lectures, assignments and group discussions were methods that the teachers used to teach Kiswahili Language to students with visual impairment. However, other methods like Debate and Handouts should also be used to enhance Kiswahili Language to students with visual impairment.

From the observation on methods and strategies of teaching visually impaired students in public teachers' colleges in Kenya, the study recommends that the lecturer method of teaching should be the most commonly used teaching method. Discussion groups should also be employed as methods and strategies of teaching visually impaired students. However, teachers should employ assignments and handouts methods and strategies of teaching visually impaired students. The study further recommends that other strategies for teaching visually impaired students like use of peer consultations between the VI students with sighted students, use of quieter rooms, teacher assistance teams; extended exam time for VI students and shorter assignments to the VI students should also be employed to enhance Kiswahili Language performance to students with visual impairment.

The study recommends that the college administration should organize sensitization programs to equip the teachers with necessary skills, facilitates the teachers to attend training seminars to increase their knowledge and skills in their profession and administration should motivate the teachers through incentives. The teachers

should be better equipped with different teaching strategies because they are the teacher trainers preparing teacher trainees to handle many learners in the field. The government should also employ more Kiswahili teachers since the teacher's were inadequate in the colleges surveyed which resulted into high teacher student ratio. The study further recommends that students and teachers should have a positive attitude of Kiswahili in learning and teaching visually impaired students.

5.5 Recommendations for Further Research

The current research was on the impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary Teachers' Colleges in Kenya. The researcher used a digital voice recorder to record some Kiswahili poetry instructions which were given to the visually impaired students to assist them in grasping poetry concepts. The researcher had a pre test poetry test and a post test by use of a control and experimental group. The findings showed positive impact when AT intervention by use of digital voice recorder was used. Further research is necessary as the findings were based on a relatively small sample that may have influenced the nature of results that were obtained. There is need to expand on the sample size and carry out a similar research on different subjects in both the private and public Teachers' Colleges in Kenya. Further, the study analysed results can be used to draw conclusions on a phenomenon and to provide adequate information that can be used for policy development and for comparison purposes and to allow generalization of findings on the impact of AT intervention on visually impaired students' performance in Kiswahili and other subjects.

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APPENDICES

Appendix 1: Letter to Respondents

University of Nairobi,
P.O. Box 30197- 00100

NAIROBI.

Dear respondents,

The purpose of this letter is to request you to kindly assist me to carry out a research on **the impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary Teachers' colleges in Kenya.** Your responses will be kept confidential and will not be used for any other purpose.

Please be honest while giving your responses. Attached to this letter find a copy of the questionnaire. Your cooperation will be highly appreciated.

Thanks in advance.

Yours faithfully,

MUTUA B. FRANCIS

E 80/82321 /11

Tel. 0728232138

Appendix 2: Letter to Respondents For ethical Considerations

University of Nairobi,
P.O. Box 30197- 00100

NAIROBI.

Dear respondents,

The purpose of this letter is to request you to kindly assist me to carry out a research on **the impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary Teachers' colleges in Kenya.** Your responses will be kept confidential and will not be used for any other purpose. This is voluntary and you can withdraw at will.

Please be honest while giving your responses. Attached to this letter find a copy of the questionnaire. Your cooperation will be highly appreciated. Please append your signature for confirmation of your willingness to participate in this research

.....
Signature

Thanks in advance.

Yours faithfully,

MUTUA B. FRANCIS
E 80/82321 /11
Tel. 0728232138

Appendix 3: Students' Questionnaire

Instructions

I am a student of University of Nairobi pursuing my PhD research on: **The relationship between the determinants of teaching and visual impaired students' performance in Kiswahili Language in Public Primary Teachers' colleges in Kenya.**

Your college has been selected for this study. Please answer the questions as honestly as possible. Your identity will be treated with the highest confidentiality and will be used for this study only. Please, do not write your name.

SECTION A: SOCIO - DEMOGRAPHIC INFORMATION

1. Please indicate your sex. Tick where appropriate.

Male	
Female	

2. Please indicate your age.

19-22Years [1]

26-30Years [3]

23-25Years [2]

30Years and above [4]

3. Please describe the state of your sight (tick appropriately)

Totally blind (Blind)	
Partially blind (Low vision)	

SECTION III: PERFORMANCE OF KISWAHILI

4. Which language do (can) you speak fluently?

English	
Kiswahili	
Others Specify	

5. Which language do you commonly use in college?

English	
Kiswahili	
Others(Specify)	

6. Which languages are used in class when teaching /learning Kiswahili. Tick where appropriate.

Kiswahili (Only)	
English and Kiswahili	
Others (Specify)	

SECTION B: PERFORMANCE OF KISWAHILI

7. How do you rate performance of Kiswahili in your college?

Very Good	[5]
Good	[4]
Average	[3]
Poor	[2]
Very Poor	[1]

Very Good	
Good	
Average	
Poor	
Very Poor	

8. How do you rate your performance in Kiswahili? Tick where appropriate.

Very Good	[5]
Good	[4]
Average	[3]
Poor	[2]
Very Poor	[1]

Very Good	
Good	
Average	
Poor	
Very Poor	

9. Do you use the following teaching activities in your college? Please indicate using the key below, to what extent you agree with them.

Strongly Agree [5]

Agree [4]

Neutral [3]

Disagree [2]

Strongly Disagree [1]

Activities	SA	A	N	D	SD
Group work					
Discussion					
Peer consultations					
Kiswahili clubs					
Guidance and counselling					
Teacher Assistance Teams (TATs)					

10. Do you believe that the following teaching/learning items affect Kiswahili and its performance of students with disabilities? Please indicate using the key below, to what extent you agree with them.

Strongly Agree [5]

Agree [4]

Neutral [3]

Disagree [2]

Strongly disagree [1]

Items	SA	A	N	D	SD
Students with disabilities have a very negative attitude towards learning of Kiswahili in the college					
Kiswahili is a difficult subject to learn					
Kiswahili is not my favourite subject					
As a national language, Kiswahili is not given priority as English in the college					
It is difficult to understand Kiswahili teachers					
Kiswahili teachers do not motivate students with visual impairment to learn kiswahili					

11. How do you perform in the following areas of Kiswahili language?

Very well [5]

Well [4]

Satisfactory [3]

Fair [2]

Poor [1]

Kiswahili areas/genre	(5)	(4)	(3)	(2)	(1)
Lugha					
Insha					
Fasihi					

12. Is there any difference in performance in Kiswahili between the Regular students and students with visual impairment?

Yes	
No	

13. If yes in item (12) above, which group of students performs better?

Regular students	
Students with visual impairment	

14. Give the reasons that attribute to this difference in performance in Kiswahili between the two groups of students.

SECTION C: AVAILABILITY OF TEACHING AND LEARNING RESOURCES FOR KISWAHILI

15. What resource materials are used to teach Kiswahili to students with visual impairment in your College? Tick where appropriate.

Statement	Not Available	Available but inadequate	Available and adequate
Braille Prints			
Radio/TV/CD			
Video			
Magazines			
Text books			
Talking books /Assistive technology.			

16. How does the availability of teaching /learning resources affect performance in Kiswahili of students with visual impairment?

SECTION D: METHODS OF TEACHING KISWAHILI

17. Which methods do teachers use to teach Kiswahili Language to students with disabilities in your College? Tick where appropriate.

Very Frequent [5]

Frequent [4]

Moderate [3]

Infrequent [2]

Very Infrequent [1]

Method	(5)	(4)	(3)	(2)	(1)
Lecture					
Group discussions					
Debate					
Assignments					
Handouts					
Others (specify)					

Appendix 4: Teachers' Questionnaire

Instructions

I am a student of University of Nairobi pursuing my PhD research on **the impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary Teachers' colleges in Kenya.**

Your college has been selected for this study. Please answer the questions as honestly as possible. Your identity will be treated with the highest confidentiality and will be used for this study only. Please, do not write your name.

SECTION A: SOCIO-DEMOGRAPHIC INFORMATION

1. Please indicate your sex. (Tick where appropriate)

Male	
Female	

2. Please indicate your highest level of Education.

Certificate [1] Bachelors Degree [3]

Diploma [2] Masters Degree [4]

3. Indicate your teaching experience in Teachers' College.

1-2Years [1] 6-10Years [3]

3-5Years [2] 10Years and above [4]

4. Which language do your students with visual impairment commonly use in college?

English	
Kiswahili	
Others(Specify)	

SECTION B: PERFORMANCE OF KISWAHILI

5. How do you rate performance of Kiswahili of students with visual impairment in PTE examination?

Very Good (Distinction) [5] VG

Good (Credit) [4] G

Average (Credit) [3] A

Poor (Pass) [2] P

Very Poor (fail) [1] VP

Very Good (Distinction)	
Good (Credit)	
Average (Credit)	
Poor (Pass)	
Very Poor (Fail)	

6. Which methods do you use to teach Kiswahili Language to students with visual impairment in your College? Tick where appropriate.

Very Frequent [5]

Frequent [4]

Moderate [3]

Infrequent [2]

Very Infrequent [1]

Method	(5)	(4)	(3)	(2)	(1)
Lecture					
Group discussions					
Debate					
Assignments					
Handouts					
Others (specify)					

7. Does your college use the following teaching activities? Please indicate using the key below, to what extent you agree with them.

Strongly Agree [5]

Agree [4]

Neutral [3]

Disagree [2]

Strongly Disagree [1]

Activities	SA	A	N	D	SD
Group work					
Discussion					
Peer consultations					
Kiswahili clubs					
Teacher Assistance Teams (TATs)					

8. How do the following teaching/learning items affect Kiswahili performance of students with visual impairment in your college? Please indicate using the key below, to what extent you agree with them.

Strongly Agree [5]

Agree [4]

Neutral [3]

Disagree [2]

Strongly Disagree [1]

Items	SA	A	N	D	SD
Students with visual impairment have a very negative attitude towards learning of Kiswahili poetry in the college					
Kiswahili is a difficult subject to learn for students with visual impairment					
Kiswahili is not a favourite subject for students with visual impairment					
As a national and official language, Kiswahili is not given priority as English in the college					

9. How do students with disabilities perform in the following areas of Kiswahili in your college?

Very Good [5] VG

Good [4] G

Average [3] A

Poor [2] P

Very Poor [1] VP

Kiswahili areas	VG	G	A	P	VP
Lugha					
Insha					
Fasihi					

10. Is there any difference in performance in Kiswahili between the Regular students and students with visual impairment?

Yes	
No	

11. If yes in item (9) above, which group of students performs better?

Regular students	
Students with disabilities	

12. Give the reasons that attribute to this difference in Kiswahili performance between the two groups of students.

SECTION C: AVAILABILITY OF TEACHING AND LEARNING

RESOURCES FOR KISWAHILI

13. What resource materials are used to teach Kiswahili to students with visual impairment in your College? Tick where appropriate.

Material	Not Available	Available but inadequate	Available and adequate
Braille Prints			
Radio/TV/CD			
Video			
Magazines			
Text books			
Talking books			

14. How does the availability of teaching /learning resources affect student's performance in Kiswahili?

SECTION D: METHODS OF TEACHING RESOURCES FOR KISWAHILI

15. Which methods do teachers use to teach Kiswahili Language to students with visual impairment in your College? Tick where appropriate.

Very Frequent [5]

Frequent [4]

Moderate [3]

Infrequent [2]

Very Infrequent [1]

Method	(5)	(4)	(3)	(2)	(1)
Lecture					
Group discussions					
Debate					
Assignments					
Handouts					
Others (specify)					

16. Are there other factors that affect performance in Kiswahili of Students with visual impairment in your college?

Appendix 5: Interview Schedule for the College Principal

Instructions

I am a student of University of Nairobi pursuing my PhD research on **the impact of assistive technology intervention on visually impaired students' performance in Kiswahili in Public Primary Teachers' colleges in Kenya.**

Your college has been selected to take part in this study. Please answer the questions as honestly as possible. Your identity will be treated with the highest confidentiality and will be used for this study only. Please, do not write your name.

1. Comment on the relationship between the severity of visually impaired students and their performance in Kiswahili Language in PTE.

2a. In your opinion what would you comment regarding the teaching/learning materials of visually impaired students in your college?

2b. Do you think the availability of the teaching /learning materials has an influence on the visually impaired students' performance in Kiswahili Language? Please comment.

3. What does the college administration do to ensure the teachers are prepared to teach Kiswahili Language to students with visual impairment?

4. Please comment on the following:

a).Adequacy of Kiswahili teachers in your college.

b).Attitude of Kiswahili teachers in teaching visually impaired students in your college.

5. What are some of the challenges you face as a college in ensuring quality teaching of Kiswahili Language to students with visual impairment.

THANK YOU

APPENDIX 6: STANDARDIZED TEST (POEM) PRE-TEST

(Azizi Abdalla Kiwillo na Khan 1981: 9)

MAAGIZO: Jibu maswali yote. Muda: Dakika: 20; Alama: 15

Tahadhari na Mapenzi

- 1 Unapompenda mtu, asiyejua kupenda,

Atakufanya si kitu, na mengi atakutenda
Atakuwa jitujitu, usipajue pa kwenda.
- 2 Watupa yako taimu, pendo lako liwe duni,

Zikutoke darahimu, hujui wafanya nini,
Kwani yeye hafamu, mapenzi yake thamani.
- 3 Kupenda asofikiri, pendo asiyelijali,

Ukumbuke ni hatari, kwa hali na yako mali,
Yafaa ujidhadhari, na kumkimbia mbali.
- 4 Kupenda mtu wa hila, kumbuka atakutesa,

Itakufikia dhila, na aina ya mikasa,
Pendo lake ni la kula, hasa ni yake pesa.
- 5 Ndipo basi fikiria, muda utakapooa,

Yataka Kuingilia, kwa makini kuchungua,
Upate kuangukia, mke alo wa murua.

6 Mapenzi taliyo bora, ambayo yatakikana,

Utaona ishara, kabla ya kuonana,

Mke aua si sura, ni moyo nakupendana.

7 Ni hapa nimefikia, beti saba barabara,

Sasa nawe mke pia, tumia yako busara,

Hasa ninalokwambia, chagua mume imara.

(Karama 1985: 8 -9)

MASWALI

1. Taja aina la shairi. (al. 1)

2. Eleza bahari zinazopatikana katika hili shairi. (al. 3)

3. Taja na ueleze uhuru wa mshairi katika shairi. (al. 4)

4. Eleza maudhui ya shairi hili. (al. 2)

5. Taja tamathali zozote tatu katika shairi. (al. 3)

6. Eleza msamiati unaofuata kama ulivyotumika. (al. 2)

a). Dhila -----

b). Darahimu -----

APPENDIX 7: STANDARDIZED TEST (POEM) POST TEST

MAAGIZO: Jibu Maswali yote. Muda: Dakika: 20; Alama: 15

KUMEKUCHA KUCHILEO

1. Usigombe ni kelele, jogoo linapowika,
Ni ishara usilale, fanya hima kuamka,
Kulala sana ni ndwele, utazikosa Baraka,
Wahi wakati haraka.
2. Akujulisha wakati, wakati wa kazi yako,
Sikiliza yake sauti, iwikapo kokoiko,
Yakwambia usiketi, fuata wajibu wako,
Kule riziki iliko.
3. Usiku ukisha kucha, achana na kusinzia,
Wenziyo tutakuacha, pekeyo utabakia,
Ubaki kuuma kucha, na kwingi kujijutia,
Huna wa kukugaia.
4. Riziki mutakosana, burangeti 'siporusha,
Amka silale tena, upate kujisafisha,
Umshukuru Rabana, kukupa tena maisha,
Hima kujitayarisha.
5. Tayari uache nyumba, uole siku ya leo,
Mkulima wende shamba, muhandishi na koleo,
Sote tuivute kamba, ya harambee tegemeo,
Kumekucha kuchileo!

(Amana 1982:47-48)

MASWALI

1. Taja aina la shairi.(al.1)

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2. Eleza bahari zinazopatikana katika shairi.(al.3)

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3. Taja na kueleza uhuru wa mshairi katika shairi hili.(al.4)

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4. Nini maudhui ya shairi hili.(al.2)

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5. Taja tamathali zozote tatu katika shairi.(al.3)

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.....
.....
.....

6. Eleza msamiati ufuatao kama ulivyotumiwa katika shairi.(al.2)

a).Ndwele -----

b).Rabana -----

APPENDIX 8: OBSERVATION SCHEDULE

The researcher will use an observation schedule to confirm the following: -

1. Severity of the visually impaired students in the sampled public teachers' colleges In Kenya. Comment on :
 - i). Totally blind
 - ii). Partially blind

2. The teaching/learning materials used to teach students with visual impairment in the sampled public teachers' colleges in Kenya. Comment on:
 - i). Braille machines
 - ii). Large print
 - iii). Any other

3. The methods and strategies of teaching visually impaired students in public teachers' colleges in Kenya. Comment on:
 - i). Discussion method
 - ii). Lecture method
 - iii). Assignments
 - iv). Peer consultations
 - v). Hand outs
 - vi). Any other

APPENDIX 9: Research Permit

REPUBLIC OF KENYA



NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

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secretary@ncst.go.ke

P.O. Box 30623-00100
NAIROBI-KENYA
Website: www.ncst.go.ke

Our Ref:

NCST/RCD/14/013/10

Date:

23rd January, 2013

Francis B. Mutua
University of Nairobi
P.O.Box 92
Kikuyu.

RE: RESEARCH AUTHORIZATION

Following your application dated 7th January, 2013 for authority to carry out research on "*Impact of assistive technology intervention on visually impaired students' performance in Kiswahili in public Primary Teachers' Colleges in Kenya*," I am pleased to inform you that you have been authorized to undertake research in Machakos & Uasin Gishu Districts for a period ending 31st December, 2013.

You are advised to report to the District Commissioners and the District Education Officers, Machakos and Uasin Gishu Districts before embarking on the research project.

On completion of the research, you are expected to submit two hard copies and one soft copy in pdf of the research report/thesis to our office.

DR M.K. RUGUTT, PhD, HSC.
DEPUTY COUNCIL SECRETARY

Copy to:

The District Commissioners
The District Education Officers
Machakos District
Uasin Gishu District.

"The National Council for Science and Technology is Committed to the Promotion of Science and Technology for National Development".