Literacy medium for learners with visual impairments

Primary literacy medium used by secondary school learners with low vision in Kenya

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Abstract

The purpose of this study is to investigate the literacy medium used by secondary school learners with low vision. The study further aims at investigating the factors that influence the leaner's choice of literacy medium.

In this study a survey design is used with questionnaire as data collection tool. A stratified random sample consisting of ninety three (93) male and female learners with low vision drawn from a special residential school for the learners with visual impairments participated in the study. Data was analyzed using descriptive statistics; frequencies and percentages.

Findings of the study indicate that majority of learners with low vision use Braille as their primary medium of reading and writing, although a relatively significant percentage also use print with and without aid of low vision devices. The learners' choice of the literacy medium was influenced by mechanical and social factor. Mechanical factors included quantity and quality of assignments, ability to take notes in a chosen medium, reading rate, comprehension and accuracy, fatigue, physical dexterity and working distance from the page. Social factors included portability, availability and the family's or teacher's perception of the learners needs.

Based on the findings, the study recommends the need to develop tools and procedures of assessing the literacy medium for learners with visual impairments as well as formalize learning medium assessment in education programming for learners with visual impairments.
Key words: literacy medium, visual impairments, low vision, assessment.

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I wish to express my sincere appreciation to all those who effortlessly gave their invaluable support towards the completion of my study.

Dedication

To my mentor, Petra Verweyen for igniting my desire to search for knowledge.

To my dear wife Miriam for your patience, understanding and support.

To my beloved daughters, Waithira and Wairimu for patiently enduring my long absence from home.

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1 Introduction

1.1 Chapter overview

This chapter presents an introduction to the study. It provides the statement of the problem, purpose and significance of the study and the research questions under investigation respectively.

1.2 Background of the study

The choice of appropriate medium of reading and writing for literacy acquisition by learners with visual impairments (those who are blind or have low vision) continues to stimulate debates among learners, teachers and eye- health practitioners in many parts of the world. Modern pedagogy has asserted that many persons with visual impairments, given appropriate low vision devices, can become print readers, thereby rendering Braille unnecessary to learn. The differing opinions by the practitioners on the most appropriate literacy medium for learners with visual impairments fuels controversy on whether to use print or Braille in educating learners with low vision. Consequently, the selection of appropriate literacy media for the learners with visual impairments has been a long standing dilemma.

To some scholars, Braille has always been and will always be more than a medium of literacy for persons with visual impairments (Spungin, 1996). Spungin affirms that for some, Braille seems to represent competence, independence and equality. However, many practitioners in the field of visual impairments believe that there are so many new high-tech aids available for children with visual impairment that it is no longer necessary to teach them Braille. Indeed, several research has significantly contributed to this perspective. For instance, the response to Barraga's (1964) research, promoted the utilization of vision where possible and the rejection of the former practice of teaching reading and writing Braille to most learners regardless of the visual abilities. This has been reinforced by the continued technological advances which enable readers with visual impairments to increase their access to reading materials previously unavailable to them.

For learners with low vision, strategies to increase independence and efficient literacy skills are critical to their success in adult life. This is because reading and writing are essential elements in education as well as for vocational and recreation activities (Wilkinson, Trantham & Koenig, 2001). Most often decisions on the appropriate literacy route (visual or tactile) for learners with low vision is faced with hindrances in assessing the individual's level of visual functioning, literacy needs as well as ability to use adaptations and/or devices for successful access to desired information.

Koenig and Holbrook (1989: p. 296) noted that, "Making choice of primary literacy media is not a concern for those who have no visual impairment (they will learn to read print) nor is it a concern for those who are totally blind (they will learn to read Braille)". Therefore difficulties may arise, in making decisions for those learners who have low vision.

Although there exists published procedures to guide teachers, parents and other practitioners in making decisions on appropriate literacy medium for learners with visual impairments (Koenig & Holbrook, 1989, 1991, 1995; Mangold & Mangold, 1989; Caton, 1991; Sharpe, McNear & Bosma, 1995), according to Sharpe and Mcnear, (1995), they are "informal" measures and not empirically based assessment tools. Hence the challenge still remains in most part of the world. As Koenig and Holbrook (1991: p.203), aptly put it "there is no magic recipe for determining the best reading and writing medium for learners with visual impairments". However, Jennings (1999) expostulated for the need to apply flexible approach in which in which Braille and print are valued equally. The basic issue for all those involved in education for learners with low vision is to make informed decision on the appropriate reading and writing medium.

1.3 Perspective on literacy medium and education of learners with visual impairments

From the time when the education for the visually impaired was instituted (around 1800) until sometime into the 20th century, the ophthalmological philosophy that emphasized and legitimized the practice of "sight saving" (not using the residual visual capacity) dominated education practices for learners with visual impairments. They all attended special schools for

the blind, where they were taught using strategies typical to blindness -tactual and auditory (Heathay, 1947 as cited in Mogk & Goodrich, 2004).

The concerns about distinction between education practices for totally blind and those with low vision were born of an awakening that that there is middle ground between sight and blindness. This led to evolvement of the term "partially blind and partially sighted".
The origin of this construct were educational institutions for the blind, like the Perkin School in United States of America, which initiated its first class for learners described as "partially blind children" in 1913 and London borough of Camberwell in 1908. Such classes were often known as "sight-saving" because it was believed that learners risked losing their remaining vision if they made extensive demands on their already weakened vision by reading print. Learners were usually taught to read Braille although sometimes they had to be blindfolded, use aprons draped over the Braille page, or required to wear high collars to prevent them from reading the Braille code with their eyes (Goodrich & Sowell, 1996).

By the 1930s, ophthalmologists had determined that learners with partial vision did not risk further vision loss by using their vision for normal activities such as reading. However, it was not until 1947 that the American Printing House for the Blind began producing large print books; because it was believed that larger print would provide easier access for print readers with low vision (Hatlen, 2000).

Even though as early as the 1930s the medical community had acknowledged that using partial sight would not cause further deterioration, it was not until the 1960s that the old practices of educating learners with low vision changed. The change was influenced by Barraga's (1964) study that highlighted the benefits of visual stimulation and utilization; hence the educators began to support the use of print with learners with low vision. Barraga's innovative work led to recognition that many children with low vision who were inaccurately labeled "blind" would be better served by education practices that included use of sight, low vision devices and teaching strategies that permitted them to learn to use their vision more effectively (Roberts, 1986).

1.3.1 The perspective in Kenya

In Kenya, formal educational services for learners with visual impairments dates back to 1946 when the first school, a rehabilitation center established by the Salvation Army and meant to

assist blind veterans of the Second World War, was turned into a school for learners with visual impairments. Later on, several others schools were started. To date, there are six special residential primary and three special secondary schools for learners with visual impairments. In addition to special schools, education for learners with visual impairments is also provided through an integrated education model in which itinerant teachers provide support services to learners with visual impairments attending regular schools (Cherono, 2003).

 The Kenyan government education policies and goal are geared towards achieving Education For All by 2015(EFA- 2015) in tandem with national and international standards. In an effort to achieve these goals, the government launched a special needs education policy framework in the year 2010. The policy frame work avows that achievement of EFA goals can only be through the provision of an all inclusive quality education and training that is accessible and relevant to all Kenyans in line with the EFA and Millennium Development Goals (MDG). It outlines the concept of inclusion practices as a departure from traditional view of "provision of special needs education" to adoption of a broad vision of making education a fundamental right for every citizen by addressing the spectrum of needs of all learners including those who are vulnerable through marginalization and disabilities (Republic of Kenya, 2010). Access to education therefore, may not be fully realized in line with these goals if effective ways of engaging learners with low vision are not put in place.

Several intervention measures to make education accessible to all have been undertaken. Among them is development of alternative (adapted) curriculum to cater for learners with special needs. To date the primary and secondary school curricula have all been adapted for learners with visual impairments, hearing impairments and physical disabilities. The adaptations only target selected subjects seen to be of difficulty to the specific disability group. The main areas of adaptation for the learners with visual impairments are found in tasks that directly involve sight; those learning activities that would disadvantage a learner who is not able to visually observe an object or task. These include concepts such as colour and any other indiscernible or fine activity that would definitely need sight. It also includes assessment and learning resources. For instance, the curriculum demands that a learner with visual impairments needs a tactile map or a model for learning to take place effectively. There

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is also some compromise on tasks that require accuracy for instance measurement in a map or calculations that require many decimal points.

The adapted curriculum in addition recommends adaptations of the evaluation processes. However, it is the responsibility of Kenya National Examination Council (KNEC) the body charged with curriculum evaluation to make the said recommendation. This has happened with varying extents of conformity. For instance, whereas the recommended extra time allowed for candidate with visual impairments is for 30 minutes for every hour, KNEC allows only 30 minutes for the whole paper.

The adapted syllabi used in the country are specifically meant for the learners who are blind. To qualify for the adapted curriculum, a leaner must be a Braille user. Learners who have low vision are not catered for at all. It is assumed that their adaptation takes place at the teacher's level in the class during the preparation and delivery of lessons. At the secondary level, the subjects adapted for the learners with visual impairments include: Mathematics, Geography, Biology, Home Science, Agriculture, Computer Science and Physical Education (F. Haga, personal communication, August 30, 2010). The ultimate goal of education in Kenya is to have a globally competitive education, training and research for Kenyan's sustainable development.

1.3.2 Genesis of education provisions for learners with low vision

In 1980s, a German based Non-Governmental Organization, Christoffel Blinden Mission (CBM) started the agitation for the change of education practices for the learners with visual impairments in Kenya, arguing that most of the learners in the schools for the visually impaired were actually not blind but had low vision and could benefit from visual learning. This prompted the Ministry of Education (MOE) jointly with CBM to conduct a study in schools for the visually impaired in 1994.

According to the study, fifty seven percent (57%) of the learners with low vision were being taught to read using Braille only, even though seventy nine percent of them (79%) had the potential to read N5-N8 print, and a further 9% had the potential to read N10-N36 print. It was further noted that low vision services and low vision devices were not available in any of the schools (Silver, Gilbert, Spoerer & Foster, 1995). This initiative however, increased awareness among educators that learners with low vision can read print which would allow

them much greater access to information, wider range of recreational activities as well as better access to educational and employment opportunities. Additionally, if learners with low vision are provided with optical devices they may attain near acuity which allows access to standard print.

In 1994 the MOE in conjunction with CBM initiated a low vision programme to provide low vision services to learners in the schools for the visually impaired. These services include, clinical low vision assessments, provision of the low vision devices and recommendation of literacy medium to learners. The Kenyan low vision programme has devised classification criteria in which education programming for students with visual impairment is premised (Rukwaro, Ireri, & Verweyen, 2000). The classification includes four categories (Verweyen & Hyvärinen, 2000) as follows;

- Category 1: consists of learners who are totally blind with no perception of light, they need training in orientation and mobility and should be educated in Braille,
- Category 2: consists of learners with low vision whose vision is not enough to read print, they require visual stimulation, functional vision training and/or training in visual orientation and should be educated in Braille,
- Category 3: consists of learners with low vision who can be trained to use their sight for reading and writing standard print with the aid of optical low vision devices,
- Category 4: consists of learners with low vision who can be able to use standard print without optical low vision devices.

Educational programming for learners with visual impairments should include thorough and ongoing assessment procedures for the selection of the most appropriate literacy medium. The assessment should be conducted by a multidisciplinary team of qualified professionals and the decision on the most appropriate medium of literacy is determined based on collective judgment of the team (Wilkinson, et al 2001). On the contrary, the Kenyan low vision programme process of selecting literacy medium for learners with low vision is one sided with inclination to clinical information and in absence of a multidisciplinary team approach. In addition, no distinctive standardized learning medium assessment procedures and tools are used to determine the appropriate literacy medium.

As Koenig and Holbrook (1989) posited, decisions on the appropriate literacy medium cannot be made on the basis of arbitrary information such as legal definitions of blindness or

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superficial classification, since learners with visual impairments use their vision with differing degrees of efficiency. Hence, decisions on literacy medium eternized by medical assessment and arbitrary categorization in absence of literary standardized procedures and multidisciplinary team approach lacks adequacy.

1.4 **Statement of the problem**

Learners with low vision are the largest subgroup of learners with visual impairments; yet their literacy needs are not adequately addressed. While some are able to read standard print, others may require the use of optical devices to read standard print or combinations of both print and Braille to acquire literacy. In Kenya, the selection of literacy medium for learners with low vision is based on arbitrary categorization with no formalized procedures, tools and guidelines followed in making decisions. In some circumstances, decisions on literacy medium are superficially made by either the teacher, the learner or the parent without any collaborative judgment of a learning medium assessment team.

Despite the increasing awareness of the needs of learners with low vision, issues regarding their appropriate literacy medium remain a dilemma which places barriers to quality access quality education. This study therefore sought to investigate the literacy medium used by learners with low vision and factors that influence the learners' choice.

1.5 **Purpose of the study**

The purpose of this study is to investigate the primary literacy media used by learners with low vision in a special secondary school for learners with visual impairments in Kenya. It further seeks to examine the factors that influence the learners' choice of the literacy medium.

1.6 **Objectives of the study**

The objective of this study is to;

- Identify the primary literacy medium used by learners with low vision who are classified as category three and four according to Kenyan categorization of learners with low vision,
- Explore factors that influence the learner's choice of primary literacy media.

1.7 **Research Questions**

The study was guided by the following research questions:

- what primary literacy medium is used by secondary school learners with low vision in Kenya?

- what salient factors influence the selection of the literacy media used by learners with low vision in Kenya?

1.8 **Significance of the study**

The ability of learners with low vision to read print is crucial to integrate them into the mainstream society and for attainment of functional literacy. However, there are some learners who are unable to achieve fluency of reading print but who have sufficient vision to make Braille an obvious choice. Such learners require a systematic learning medium assessment to determine the most appropriate literacy medium.

Although there is no magic recipe for determining the best reading and writing methods for learners with visual impairments, a systematic individualized learning medium assessment is a crucial element in the education programming for learners with low vision. Koenig and Holbrook (1991) observed that too often, the decision as to whether a learner should follow a mainly print or Braille route to literacy is not fully informed. They noted that the best professional practice specify that education decisions must be made by a multidisciplinary team according to individual needs and abilities, based on information obtained from a systematic assessment through a defined criteria.

This study therefore set to provide insight on literacy medium learners at secondary school use and examine the salient factors that influence the learners' choice. Such information would be valuable in preparing guidelines to support decision making process in the process of selecting the most appropriate and efficient medium of reading and writing for learners with low vision.

1.9 **Definition of terms**

- Visual impairments- refers to a disability encompassing a continuum from blindness to low vision (Baird & Moore, 1993).

- Low vision – refers to a significant reduction of visual function that cannot be corrected to the normal range by ordinary glasses, contact lenses, medical treatment, and/or surgery but can be enhanced with the use of compensatory visual strategies, optical aids, non-optical aids, and/or environmental modification" (Corn & Koenig, 1996).

- Legal blindness, a definition used to determine whether an individual with vision impairment is eligible for government benefits. It is defined by a visual acuity of 6/60 in the better eye with the best correction and/or a visual field of less than 20 degrees in the widest meridian of the better eye (Baird & Moore, 1993).

- Primary literacy media- medium most frequently used during classroom instruction. It should allow access to the greatest variety of educational materials. (Koenig & Holbrook, 1995).

- Secondary literacy media-media that is not frequently used but allows learners to perform specific tasks not easily performed in the primary medium. It may alleviate fatigue experienced when using the primary learning media for extended period of time. (Koenig & Holbrook, 1995).

- Literacy refers to ability demonstrated by successful and meaningful application of reading and writing skills to accomplish desired and required literacy tasks in all environments (Koenig, 1992).

- Functional literacy refer to successful application of reading and writing skills to accomplish real-life tasks that are required in the home, school, community and work environment (Koenig, 1992).

- Appropriate literacy medium refers to most efficient reading and witting medium in meeting the informational needs of the person with visual impairments (Koenig, 1992).

1.10 **Organization of the thesis**

This study is presented in five chapters. Chapter 1 gives the background of the study. The problem is defined leading to formulation of research questions and definition of key concepts. A brief description on literature related to persons with visual impairments and an overview of Kenyan situation on educational for persons with visual impairments is provided. Chapter two focuses on review of previous related literature. Additional information on some key concepts is provided within the text too. Chapter three provides the details of method employed in the present study. Chapter four presents data and analysis of the study. In addition, comments are provided on some aspects of the results. Chapter five discusses some of the major findings of the study in view of the previous studies.

In summing up, the present study has not dwelt at length on perspectives on Kenyan studies and literature on education of learner's with low vision, other than the basic perspective provided. This is because there is minimal literature focusing on visual impairments in relation to literacy medium in Kenya.

2   Literature Review

In this chapter, relevant literature to the study about the literacy and literacy medium for learners with visual impairments is reviewed. This chapter also provides information on broader aspects of visual impairments, with a view of illuminating some concepts on literacy needs for learners with low vision.

2.1   Introduction

During the last few decades tremendous changes have occurred in the philosophy and practice associated with the education of learners with visual impairments. Learners with low vision, who had few opportunities to use vision for literacy acquisition, now frequently attain their formal education through visual modes of learning. Learners who use Braille as their primary reading medium now have the chance of using a variety of other technologies to make print materials more accessible to them. Further, new pedagogical philosophies and technologies have impacted upon all levels of schooling. This has made written communication available in a wider scale and in newer forms than never before; the range of technology and assistive equipment is growing rapidly and no group stands to benefit more from the new opportunities than learners with visual impairments, regardless to whether one is a Braille user, print or combination of both. The new developments have therefore opened a lot of opportunities for learners with visual impairments making the dream of literacy acquisition more feasible.

Despite, these positive advances, the selection of appropriate medium of reading and writing for learners with low vision continues to stimulate debates among learners, teachers and eye-health practitioners in many parts of the world. One of the central issues is whether learners with low vision should use standard prints, large print, optical devices, Braille or a combination of media to acquire literacy skills.

2.2   Education for learners with visual impairments

According to Kirk, Gallagher & Anastasiow (2006), visual impairment is regarded as a disability that falls along a continuum ranging from near normal vision to profound visual impairments (blindness). Only a small number of learners with visual impairments are found at the blindness end of the continuum. Visual impairments can be classified in several ways.

Three classifications based on visual acuity measures have been offered by (World Health Organization, 1993) as follows;

- Low vision: Less than 6/18 but better than 6/60
- Severe low vision: Less than 6/60 but better than 3/60
- Blind: Less than 3/60 to No Light Perception (NPL)

The definition based on quantification of visual acuity such as the one offered by WHO forms the parameter in which legal definition of blindness is premised. However, educational classifications of visual impairments differ from legal definition. They are not based on visual acuity measures, but on the special needs educational adaptations that are necessary in education programming for learners with visual impairments. The classification is based on three criteria; moderate, severe and profound. Learners with moderate visual impairments can benefit from use of vision enhancement devices and can be placed either in the general education classroom or in a resource room. Learners with severe visual impairment barely benefit from visual devices, though they can use vision as a channel in the learning process. Learners with profound visual impairments cannot use vision for education purposes. For such learners, tactual and auditory senses are the predominant learning channels (Douglas & McLinden, 2005).

In context to this study, a learner with low vision is one "who has difficulty accomplishing visual tasks, even with prescribed corrective lenses, but can enhance his or her ability to accomplish these tasks with the use of compensatory visual strategies, optical aids, non-optical aids, and/or environmental modification" (Corn & Koenig, 1996).

During the first half of the 20th century, it was generally believed that the use of impaired vision by learners with low vision would further harm the eyes. As a result, education programmes restricted the use of vision by learners with low vision. In the early 1960s, Dr. Natalie Barraga published research supporting visual utilization in education of learners with visual impairments (Barraga, 1964). This led to development of visual efficiency assessment tools and materials designed to promote visual stimulation and utilization. Barraga's innovation initiated great interest and support for new approaches to the education of learners with low vision. A wide variety of instructional materials and programs were developed to enhance visual utilization as a source of information gathering and learning. Emphasis on the

importance of functional vision assessment and visual stimulation of learners with visual impairments evolved and became a critical part of the requisite assessment used for program planning and instruction for learners with low vision. Implementation of Barraga's research resulted in fewer children with low vision receiving literacy instruction in Braille.

As instructional programmes for visual efficiency became more prevalent in school programmes, concern were expressed about the literacy skills of learners who were reading print at slow rates, learners who could read only for short periods, and learners who were losing their vision. Questions such as how the choice is made regarding a learner's literacy medium and whether a learner should be primarily a print reader or a Braille reader became apparent.

To address concerns on literacy media for learners with visual impairments a battery of professional literature addresses procedures for selecting appropriate learning medium (Caton, 1991, 1994; Koenig & Holbrook, 1989, 1991, 1995; Mangold & Mangold, 1989; Sharpe, McNear & Bosma, 1995; Sanford & Burnett, 1997). Despite the existence of a wide range of literature and tools for guiding in the selection of literacy medium, the debate still continues particularly in countries like Kenya where the development of education programmes for learners with low vision are still in infancy. Moreover, as Corn & Ryser (1989) observed, studies that have been done had insignificant impact on educational practices and it appears that many practitioners continue to make judgment about the reading mode for individual children without regard to the child's particular needs. For instance, in Kenya the decision on literacy medium is based on arbitrary categorization with no formalized procedures, tools and guidelines followed in making decisions on appropriate literacy medium for the learners. In some circumstances, decision is superficially made by either the teacher, the learner or the parent without any collaborative judgment of a learning medium assessment team (Kimani & Rukwaro, 2007). Research is therefore needed to address this invariable gap.

Much has been written about reading in print and Braille (Danielson & Lamb, 1983; Hatwell, 1985; Nolan & Kederis, 1969; Rex, Koenig, Wormsley & Baker, 1994). From available literature, it is readily understood that there exist a differences between Braille and print. The differences are found largely in the sensorial system in which the text information recovery process lies. Thus, classic research by Nolan and Kederis (1969), suggested that Braille reading is performed through the sequential recovery of information, letter by letter, which

implies a highly specific situation that is very different to that of visual reading, in which each visual fixation contains configurations of groups of several letters – the number of which depends on the reader's ability. Thus, when reading Braille, the information must be stored in the memory (working memory) until it reaches sufficient volume to allow the identification of a whole word. The time for the identification of a word includes the precise time needed to perceive each one of the letters that form a word plus the necessary time to integrate this previously stored information and thus identify a whole word. This double process explains the reduced reading speed rates shown by Braille readers, a mean of 100 to 120 words per minute against the 280 to 300 words reached by sighted individuals.

Likewise, there exists empirical evidence about the similarities in the process of learning to read and write whether through visual or tactile medium. However, much of the debate has implicitly reinforced the presupposition of the superior status of the print. While some learners with low vision are able to use standard print, some are unable to achieve fluency in print although they are 'visual'. For many teachers and parents such learners pose a challenge on the decision about the appropriate literacy medium, a dilemma which places a barrier to literacy acquisition.

2.3 Literacy and literacy medium for learners with visual impairments

2.3.1 Literacy skills for children with visual impairments

Literacy is believed to be a prerequisite to independence and a vital tool for economic success, dignity as well as perceived self worth. Research on literacy for children with visual impairment indicates that they are at risk of acquiring literacy skills compared to their sighted peers (Preisler, 1995). This may be contributed by limited opportunities of incidental learning from the environment due to reduced visual capacity. To understand literacy development, three levels of literacy have been identified by scholars. These are emergent, basic and functional literacy.

Emergent literacy is described as early experiences in reading and writing and includes the period between birth and the time children read and write conventionally. Emergent literacy is characterized by development of understanding that abstract symbols have a meaning and

these symbols are used for communication. For children with normal sight, the process of developing emergent literacy occurs through observing others' using literacy tools and then imitating them. They come across written prints and start scribbling without much involvement and intervention of adults. However, children with visual impairments are not able to observe and imitate others without planned involvement and intervention from an adult. Koenig (1992) recommends that children with visual impairments should be directly exposed to literacy materials in which they will use in their future reading and writing medium, so that emergent literacy is nurtured.

Basic literacy which is also referred to as academic literacy is the reading and writing skills one develops through the education process. It is the skills acquired through school-based curriculum and include reading and writing skills. It is demonstrated when an individual achieves an eighth-grade reading level in the individual's primary reading medium with commensurate writing skills in the same medium. It can be urged that basic literacy skills allow an individual to develop more practical literacy skills (Koenig, 1992).

Functional literacy refers to successful application of reading and writing skills to accomplish practical real-life tasks that are required at home, school, community, and work environments. According to Koenig (1992), for persons with visual impairments to achieve full and equitable assimilation to society which is dominated by print materials, an individual needs additional communication skills to gain access to print independently.

The goal of becoming literate is a paramount endeavor for all learners, but the route to literacy differs not only in means of perception(tactile and visual) but on the decision made as to which route is more appropriate and efficient depending on the child needs and situations.

2.3.2 Braille and literacy

Braille was invented by Louis Braille during the twentieth century. It is a tool used by people with visual impairments to gain literacy skills by providing the users to a method of both reading and writing. Since its invention, Braille code has undergone various stages in its evolution and so is the educational implementation of Braille instruction and use by school-age children.

Several studies have found that the proportion of persons using Braille is remarkably low and Braille literacy has declined over the past decades (Council of Executives of American

Residential Schools for the Visually Handicapped, 1990; Johnson, 1996; Spungin, 1989; Walker, Tobim, & McKnnel, 1991). Two factors have been cited to have created a significant impact on changing attitudes toward Braille use; first, the move from "sight saving" to visual utilization; secondly, the increasing use of technology for access to print for both learners with low vision and those who are blind. The above cited trend and factors although they may have some significance to issues relating to Braille as literacy medium in Kenya the circumstances might be different. For instance Dr. Barraga's work may have influenced the education practices, but not to an extent of remarkable decline in use of Braille by learners with low vision in Kenya. Further, access to technology is still a big challenge. Therefore these factors may provide a context into which investigation related to literacy medium for learners with visual impairments can be premised.

2.3.3 Print adaptations for learners with low vision

Determining the appropriate method of adaptations to magnify text for learners with low vision is an important issue, to ensure that difficulties in reading do not impede progress in educational, vocational and recreational activities. Such adaptation may include closer working distance (relative distance magnification), use of magnifiers (angular magnification), higher contrast material, large print and use of electronic devices.

Relative distance magnification involves holding the materials closer to the eyes. Learners with visual impairments naturally use this simplest type of magnification to read smaller printed materials. This is a normal adaptation that learners with visual impairments make, and should not be discouraged. However, learners with a working distance of two inches or less need careful monitoring for signs of fatigue and other reading difficulties that may develop over time. These difficulties may indicate the need for an alternate primary literacy medium.

Angular magnification involves the use of a low vision device (such as a hand held magnifier or telescope). Electronic magnification involves the use of video magnification devices; such as a closed-circuit television (CCTV) - a device that enlarges written or printed text; head-mounted video-magnification device and computer software that enlarges and enhances the quality of images on a computer. With the continuing advancement of technological options available to individuals with visual impairments, electronic magnification is being used on a more regular basis in a wider variety of settings.

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Large print provides relative size magnification by enlarging the print size. This practice has been extensively studied in learners with visual impairments (Corn & Ryser, 1989; Sykes, 1971; Sloan & Habel 1973). Sykes reported that learners with visual impairments, utilizing best optical corrections, had equivalent reading speed and comprehension in standard print versus large print. Hence, the use of optical devices, when appropriate, should be viewed as the least restrictive approach to gain access to all regular print materials rather than use of large print. Moreover, many teachers provide large-print books without objective data to support the learners' needs.

Large print however, has a number of distinct disadvantages versus other learning media. These disadvantages include; firstly, the total head-sweep needed to read large-print is time consuming and tiring. Secondly, there are few large print books in publication. Thirdly, the learners may not be able to independently access regular print materials resulting in functional illiteracy. Fourth, fractions and labels on diagrams are often not enlarged to large print size. Lastly, current choices of books and magazines for pleasure reading are limited. However, despite the disadvantages of large print, there are many reasons why it has been made available to learners. Teachers may provide large print to feel good about doing something for their learners with visual impairments or to continue what has been done for years. Parents, teachers, and eye- health care professionals may have a positive perception of the value of large print based on comments from elderly family members; the general education teacher or parent may request large print materials, while the teacher of learner with visual impairments may not have data to support a more appropriate choice. Nevertheless, there are some advantages of large print in that it may facilitate the learner's ability to read exponents and other small number notations in math books. It may also be used as a transitional tool for learners who are switching their primary literacy medium from print to Braille.

2.3.4 Assistive technology for learners with visual impairments

The technological developments during the last few decades have significantly increased access to information in all formats for learners with visual impairments. As Kapperman & Sticken (2000) observed, the ability to access information is essential for success in education employment and life. Therefore, much of the development of assistive technology has focused on providing access to information. In particular, devices to read and write Braille and print have significantly improved with the application of new technology. Such devices include

audio technology (tapes and tape recorder, auditory text, recorded texts and synthetic speech) as well as computer based technology such as Braille embossers (specialized tactile printer) advanced CCTV, scanners and optical character recognition software (technology that scans printed text and provide the user with speech output), computer screen readers, Compact Discs (CDs) and multiple hardware and software innovations.

Computer and assistive technology are often cited as the means to overcome limited access to print and other environmental barriers for non print readers (Gerber, 2003). Gerber notes that plethora of researchers and practitioners in the field of visual impairment have acknowledged that the use of computers and assistive technology can change the lives of people with visual impairments to a great extent by improving education and employment opportunities, enhancing social network and facilitating independence.

In essence, assistive technology has potential to be the "great equalizer" for persons with visual impairments (Michaels & McDermott, 2003). For instance many career opportunities requiring access to visual information are now accessible to those who have visual impairments through the application of appropriate technology. It is generally accepted that assistive technology has positive impact on the lives of the person with visual impairments (Kapperman, Sticken, & Heinze, 2002; Strobel, Fossa, Arthanat & Brace, 2006). However, the advance in technology on the other hand has been cited as a factor for declining Braille use and Braille literacy (Spungin, 1989). In addition, assistive technology omits grammatical structure, spelling and traditional text formats. Therefore, as assistive technology market continues flourishing with devices and software that make the visual world significantly more accessible to person with visual impairment, educators need to evaluate their applicability and effectiveness to literacy related needs.

2.3.5 Selecting appropriate literacy medium for learners with visual impairments

The selection of appropriate literacy medium for learners with visual impairments has been a long standing dilemma. During the past decade, professionals in the field of visual impairments have developed numerous assessment procedures and tools specifically designed to assist in determining the most appropriate learning media for learners with visual impairments (Koenig & Holbrook, 1989, 1991, 1995; Mangold & Mangold, 1989; Caton, 1991; Sharpe, McNear & Bosma, 1995). Although it may be presumed that learners with

severe visual impairments will need to learn Braille, it is necessary to conduct learning medium assessment before it is decided which literacy medium Braille, print, or combination a learner needs. The degree to which a given learner uses a specific medium will be influenced by many factors; age, general ability, visual and tactual functioning, visual prognosis, motivation, academic and non-academic demands, environmental conditions, personal and interpersonal factors (such as an acceptance of one's blindness) and reaction to societal attitudes about blindness (Caton, 1991).

Each learner with visual impairments has a unique personal journey to literacy that should include all the necessary literacy tools and media to meet school and daily living needs. Koenig & Holbrook (1989) proposed the need to fill a learner's 'tool box' with all the 'tools' necessary to accomplish the demands of the specific tasks and thereby demonstrate functional literacy. Therefore, planning and preparing for a learner's literacy needs throughout his life is a challenging yet important task. It is apparent that the determination of a leaner's literacy medium is not an "either and or" decision. Nor is it a final one. Learners change, as do their needs for different types of information. More practitioners are realizing the benefits of having learners use both print and Braille, and supplementing reading with auditory information. Supplementary literacy tools, such as E-books and materials on CD-ROM, are helpful as learners approach tasks requiring increased reading and writing skills in higher education. All learners need access to a variety of literacy tools. However, the central issue is the determination of the most appropriate medium as a literacy tool.

In reviewing the literature on pertinent issues regarding literacy and literacy medium for learners with visual impairments, it is apparent that the majority of information is generated in response to circumstances in the United States and Britain. Nevertheless, the issues expressed in the literature are equally pertinent to Kenya. However, there are factors present in Kenya that have the potential to create different scenarios. For example, majority of learners in Kenya attend special residential schools for the visually impaired. In addition, while selection of literacy medium is guided by the use of common criteria and documented procedure, mandated by legislation in USA and Britain, in Kenya, there are no formal guidelines or legislation to guide such a process. In most instances, the teachers of learners with visual impairments take a leadership role in determining the learning media. From a Kenyan context therefore this study yields information that can be used by teachers and other

stakeholders in the processes of making decisions in regard to the appropriate medium of reading and writing for learners with low vision.

3   Research Methodology

The main goal of this study is to investigate the primary literacy media used by learners with low vision in a special secondary school for the visually impaired learners in Kenya. It further seeks to examine the factors that influence the learners' choice of the primary literacy medium.

The subsequent chapter describes the methodological procedures used in the study. These include; research design, selection criteria of the sample population, data collection instruments, data collection procedures, validity and reliability as well as data analysis**.**

3.1   Research design

Research design has been defined differently by many scholars. Bryman, (2004) defines a study design as a structure that guides the execution of a research method and the analysis of the subsequent data. A study design is thus the frame work for data collection and analysis which enables systematic conduct of the study. It can also be referred to a procedural plan that is adapted by the researcher to answer question validly, objectively and accurately (Kumar, 2005). To be able to meet the goals of this study, cross-sectional descriptive survey design was used. Cross-sectional descriptive research is a type of research that involves acquiring information about one or more phenomenon at one point in time.

This design is widely used in educational studies and is suitable when the researcher wants to answer the questions of what things are like and not why they are that way De Vaus, (2002). In addition it allows for generation of accurate description of a phenomenon; establish opinions, competencies, attitudes and suggestions for improvement of existing phenomenon, (Gall, Gall & Borg 2007). The descriptive nature of this design makes it suitable for this study since the goal is to establish the media used by the learners with low vision and the factors that contribute to their choices.

3.2 **Research Participants**

This sub section describes the process followed to select the sample population.

3.2.1 Study area

There are three special residential secondary schools for learners with visual impairments in Kenya, with an enrolment of two hundred and twenty four (224) learners with low vision. Among the three schools, one is classified as a national school; meaning that it enrol the learners who performs exemplary well in Kenya Certificate of Primary Education (KCPE) from all the forty seven (47) administrative counties in the country. This school was purposefully selected as the site of the study because being a national secondary school; learners enrolled are drawn from all the forty seven counties in Kenya, therefore represents variations in the target population in form of geography, culture, academic aptitude and social economic factors. In addition it has the highest concentration of target population for the study seventy nine point nine percent (79.9%) compared to twenty point one percent (20.1%) from both other schools.

Table 3.1: Population of learners with low vision enrolled in special schools

School for Visually Impaired	class	Number of Students with low vision	% Distribution
School Q	1 to 4	179	79.9%
School R	1 to 4	27	12.1%
School S	1 to 4	18	8.0%
Total		224	100%

3.2.2 Target population

Two criteria of identifying the target population of one hundred and seventy nine (179) learners were used; firstly, identification of male and female learners with low vision enrolled in form one to four in a special secondary school. Secondly, identification of those classified as category *three* and *four* according to Kenyan classification of persons with low vision. The Kenyan classification of person with low vision defines category *three* as learners with moderate low vision who can be able to access print as a medium of reading and writing with

the aid of optical low vision devices whereas category *four* are learners with borderline low vision who can access print as a medium of reading and writing without the aid of optical low vision devices. *Form four* (grade level) learners who comprise of (40 learners) 22.3% of the target population were excluded from the study. Because the period planned for data collection coincided with the Kenya Certificate of Secondary Education (KCSE) examination period, hence they could not participate in the study.

3.2.3 Sample population

It is recommended that for smaller population like in this study, there is little point in sampling (Gay, Miles, & Airasian, 2006). However, sampling was deemed necessary due to two factors. Firstly, the *form four* learners who were earlier expected to participate in the study could not participate. Hence, the issue of generalisation came into focus. Secondly, there were two distinct groups within the population (category 3 and 4 of low vision). Thus, sampling had to apply to ensure proportionality of representation of the two sub groups.

According to De Vaus, (2002) for a sample to be representative the proportion of various groups in the sample should be the same as in the population. To ensure proportionate inclusion of category 3 and 4 as distinct subgroup in the sample, a stratified random sampling was applied with the category being the stratifying variable. The process consisted of three steps as following

Step1: Development of a sampling frame using information derived from the admission records as summarised by illustration below;

Total target population = 179 students

Accessible Population cat 3 form 1-3=72

Accessible Population cat 4 in form 1-3= 67

Sample size required for category 3= 54

Sample size required for category = 49
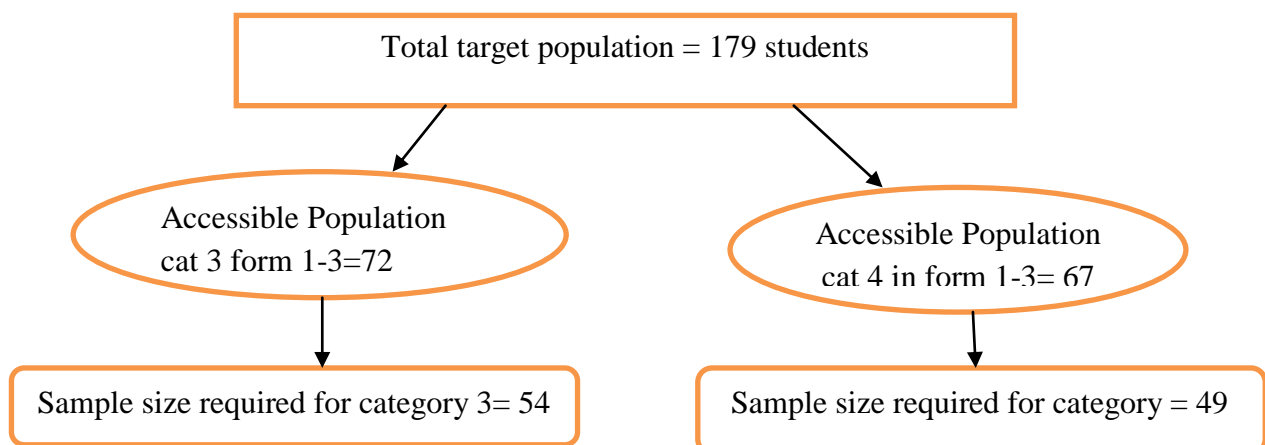
Step 2: Involved the determination of the desired sample size using Yamane 1967 formula to calculate sample sizes as suggested by Kombo and Tromp (2006). This formula assumes a degree of variability (i.e. proportion) of 0.5 and a confidence level of 95%.

$$n = \frac{N}{1 + N(e)^2}$$

Where: n = sample size; N = population size; e = the level of precision. In this study the level of precision is 0.05,

$$n = \frac{139}{1 + 139(.05)^2}$$

$$n = \frac{139}{1 + 0.3475}$$

$$n = \frac{139}{1.3475}$$

$$n = 103$$

Hence a sample size of 103 participants was selected for this study.

Step 3: Involved drawing a random sample in both strata based on relative proportional distribution as presented in the sample frame in Table 2 below.

Table 3.2: Sampling frame

Enrolled and stratified sample

Form	One		Two		Three		Total
Category	**3**	**4**	**3**	**4**	**3**	**4**	
Number enrolled	**20**	**22**	**27**	**23**	**25**	**22**	**139**
% of the group	14%	16%	19%	17%	18%	16%	100%
Sample size	15	16	20	17	19	16	**103**

Finally, a sample population of 103 learners, based on relative proportional distribution of 54(51%) learners in strata of category three and 49(49%) learners in the strata of category four participated in the study.

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3.3 **Instrumentation**

According to Befring (2004) questionnaires, interviews and observations are three main strategies of empirical data collection. De Vaus (2002) defines questionnaire as a highly structured data collection technique whereby each respondent is asked the same set of questions. In this study a structured self-developed questionnaire using closed or forced choice questions where respondent were offered alternative replies for quantitative analysis was used as data collection instrument.

The choice of questionnaire as an instrument of data collection was based on its strength in allowing anonymity and privacy since the focus was to solicit information relating to respondents attitude, behavior and attributes on a subject that has been on a protracted discussion. Anonymity was therefore deemed very necessary to elicit honest responses.

 The questionnaire comprised of three sections (see Appendix 1). Section (a) was used to collect participant's clinical measures and level of visual functioning. This included the diagnosis, distant and near visual acuity, visual field and the prognosis. This information was extracted from the learners' individual medical records.   Section (b) contains five items that were used to collect participant's demographic profile which included grade level (form), age, gender and type of primary school attended. In addition the participants were asked to select the primary medium of reading and writing they used while at primary school, what they currently use at secondary school and the most preferred medium from a list of possible media.

Section; (c) was designed using Caton (1991) model as a basis since it provides a coherent structure within which to organise a broad array of determinant factors; mechanical factors and social factors. The section contains 13 positive statements arranged to control any bias. The rating occurred on a five - point Likert scale whose responses were rated based on Strongly disagree, Disagree, Neither disagree nor agree, Agree and Strongly agree.

3.3.1 Pretest

According to Befring (2004), it is necessary to pre-test all the questionnaire and procedures that are to be used in the research process. The questionnaire for this study was pre-tested

using colleagues at a low vision clinic in Kenya. A further pretest was carried out in a special school for the blind using three teachers with low vision (1 female and 2 male). Feedback received helped in reviewing the questionnaire by reconstructing some of the items to avoid ambiguity and improve on clarity.

3.3.2 Pilot testing

According to Robson (2002), a pilot study is a mini – version of the study and should be conducted before the researcher engages in the main study. Creswell (2003) observes that pilot testing helps to establish content validity of the instrument and improves questions, format and the scales. A pilot study was carried out using twenty (20) form four learners with similar characteristic as the study participants. Some practical experiences were gained through this exercise, which were useful in refining the instrument, particularly on language and terminologies to suit the participants' level of understanding. Generally the exercise confirmed that the study participants would comprehend the research tool as exhibited by the minimal missing data during the pilot study.

3.3.3 Validity and reliability

Validity refers to the degree to which an instrument truly measures what it is intended to measure. On the other hand reliability is concerned with the degree to which an instrument consistently measures whatever it is measuring (Kombo & Tromp, 2006). In other words the instrument used in a study is expected to yield an accurate measure that reflects reliable picture of the problem under investigation. In the development of the instrument for this study, its administration and data analysis, reliability and validity were given a high priority more so because the instruments used were specifically developed for this study. Caution was thus needed to avoid using a measuring device for research that was not truly measuring what it is purported to measure. In this regard the following steps were taken to procure both validity and reliability:

(a) *Pretesting and piloting the instruments:* To ensure validity and reliability, a rigorous pretesting was done before a pilot test was conducted with leaner's who had similar characteristic with the sample population. During this process appropriate adjustment were made to purge the possible gaps with a view of strengthening the validity and reliability.

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(b) *Construction of the items and standardization of the procedure:* to ensure construct validity short and straight forward, close ended questions were used. This allowed the respondents to approximate as close as possible the exact response. In addition a detailed verbal description of key concepts and clear instructions was provided during the group administration which I personally conducted.

(c) *External validity:* to strengthen external validity, due attention was exercised in the sampling procedure with a view of achieving a representative sample. The use of stratified sampling strategy in this study ensured that the sample not only represented the overall population but also key subgroups of the population in addition to allowing the use of different sampling fraction within the different strata to randomly over sample the underrepresented cases. Further, a relatively sizeable number of respondents participated hence strengthening the reliability of the data and to increase chances of generalization of the findings to the study population.

(d) *Statistical considerations:* A reliability test was calculated through Cronbachs Alpha using SPSS version 12 which yielded a value of 0.73. Coefficient alpha of .70 and above is considered to be a reliable coefficient thus the questionnaire was qualified as valid.

3.3.4 Ethical considerations

Kombo & Tromp (2006) defines ethics as a concept that "refers to a complex of values, standards and institutional schemes that help constitute and regulate scientific activity". Suffice to say and in observance with ethical requirements, a number of measures were taken in this study. Firstly, in order to comply with both Norwegian and Kenyan requirement for research ethics, authority was sought from the relevant institutions using the research proposal and introductory letter given from the University of Oslo as the supporting document detailing the researchers' information and the study programme (see appendix 2).

Research clearance was granted from Norwegian Social Science Data Services (NSD) and Kenya National Council for Science and Technology (KNCST) (see appendix 3 and 5). Both of the above institutions lay stress on maintaining the participant's anonymity, rights as participants and respect towards the participants. To ensure compliance with this demand, learners, teachers and the school administration were informed of the purpose of the study. Further, participants were made aware of their rights as participants, such as the ability to stop their involvement at any time and matters of anonymity and confidentiality. Confidentiality

was heavily emphasized; learners were reassured that teachers, school officials or anyone else other than the researcher will not have access to their answers.

For the participants' consent the questionnaire contained an opening portion which required that each respondent consents before proceeding with anonymous completion of the questionnaire. In addition consent was also given by the Head teacher on the basis that the school being residential, the Head teacher is recognized as a lawful custodian of the learners.

Secondly, special ethical considerations for persons with disabilities have been taken into account in this study. Participants who have disabilities are viewed as having a high degree of vulnerability (Mertens & McLaughlin, 2004) and it is recommended that extra care should be taken when they form the study population. In this regard I established a trusting relationship that conveyed an atmosphere of respect and acceptance. In addition language used in presenting results is that of 'person first' followed by the impairment factor, hence placing less emphasis on the disability (Mertens & McLaughlin, 2004). Throughout my presentation I refer to participants as learners with visual impairments or learners with low vision.

Finally, as a researcher has the obligation to report back their findings to their participants, the participating school, the National Council for Science and Technology will each receive a copy of this thesis as a final research report. It is my aspiration to receive a feedback from learners, teachers, administrators and fellow researchers, I also hope this research can be used as an aid to benefit the learners, teachers and other practitioners involved in education and rehabilitation of learners with visual impairments.

3.4 Data collection procedures, management and analysis

As initial information gathering process, the questionnaire was coded using numerical values. The codes were paired with individual participants' medical records from which data on clinical measure were extracted by the researcher with the assistance of the school nurse. A list paring the questionnaire code with the name of the participant was developed in this process. This list was used during the distribution of the questionnaire to ensure that, each participant was given a questionnaire that corresponded with his/her clinical measures. The

next process involved a two hours session in which the researcher administered predetermined questionnaire to the participants. The codes which were written in pencil were erased immediately the participant returned the questionnaire and the list used in extracting the clinical measures was also discarded to conform to anonymity and confidentiality issues.

The data collection process went on smoothly except that five participants willfully withdrew from the study and five participants were absent from the school on the day the questionnaire were administered. In total 93 questionnaires were administered and collected. Information gathered from the questionnaire was then coded and entered into SPSS (Statistical Package for Social Sciences) version 12 for quantitative data analysis using statistical measures (frequencies, percentages and cross tabulation). This process was undertaken with the guidance and support from a lecturer at a local Kenyan university.

4 Presentation and data analysis

4.1 Introduction

This study intended to investigate the literacy medium used by learners with low vision at secondary schools in Kenya. Further, the study also intended to identify factors that influence the learners' choice of the literacy medium. This chapter presents details from the results of the survey questionnaire administered to learners with low vision in a special secondary school in Kenya. The questionnaire was administered to ninety three (93) learners representing 90% response rate. The analysis of the collected data in line with the research objectives is presented in the following sections.

4.2 Demographic Characteristics of learners

Of the 93 learners, 65.6% were male while the rest 34.4% were female. This data suggests gender disparity in access to education by female learners with low vision compared to that of male learners.

As for the grade level (class) distribution, thirty two point three percent (32.3%) were enrolled in form I, 34.4% in form II and 33.3% were enrolled in form III. This represented an equitable distribution of the sample in all grade levels. Majority of the learners (71%) were in the age brackets 16-19 years. This was in line with national age distribution of learners in secondary schools in Kenya. However, a significant percentage of the learners (11.8%) were in the age brackets 20-23 years implying that some learners with low vision start schooling late.

The data also indicates that majority (75.3%) of the secondary learners attended special primary schools as opposed 21.5% and 3.2% who attended regular and integrated schools respectively. This shows that Kenya is yet to fully implement inclusive education practices as majority of learners with low vision continue to attend special residential schools or integrated programmes for the visually impaired both at primary and secondary education. The data on selected demographic characteristics of the learners are presented in table 4.1.

Table 4.1: Learners Demographic profiles

Demographic Characteristics		Frequency	Percentage
	FI	30	32.3
	FII	32	34.4
Academic level	FIII	31	33.3
	Male	61	65.6
Gender	Female	32	34.4
Age Distribution	15- below	13	14
	16-19	66	71
	20-23	11	11.8
	24-27	3	3.2
	regular	20	21.5
	integrated	3	3.2
Form of Primary School attended	special	70	75.3
	Regular	33	35.5
Curriculum used currently	Adapted	60	64.5

4.3 **Visual characteristics of the learners**

Analysis on the visual characteristics of the study respondents revealed a variety of findings. Based on the data, majority of the learners (41.9%) had Distant Visual Acuity (DVA) of between 6/36 - less than 6/18 in their better eye. However, a significant majority (36.6%) had DVA of 6/60 - 3/60 while 19.4% had DVA of less than 3/60 and a small number of 2.2% had a DVA better 6/18 which is within the range of normal vision according to 1992 World Health Organization (WHO) definition of low vision. Hence, they are not visually impaired although; they are enrolled in a school for the visually impaired. However, the visual characteristics of significant majority of the respondent as observed in this study are within parameters of the WHO categorization of persons with low vision. The data on visual characteristics is summarized in figure 1.

**Figure 1: Distance Visual Acuity of the best eye**
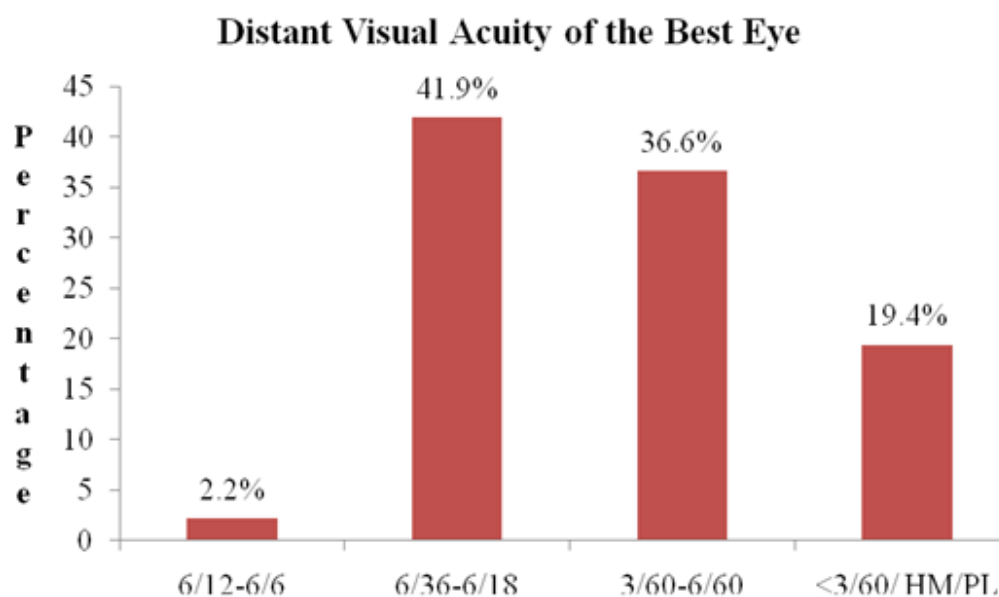
In terms of Near Distance Visual Acuity (NDVA), majority of the learners (68.8%) were within the range of N5-N10 while the rest (31.2%) were within the range of N12-N14. This indicated that 68.8% of the learners may be capable of reading standard print with ease while 31.2% may need help of magnification to read standard print.

4.3.1 Causes of visual impairments among the learners

In regard to diagnosis the respondents revealed that the following were the causes of low vision among the learners: Albinism (20.4%), cataract (12.9%), optic atrophy (8.6%), Maculopathy (8.6%), corneal scars (7.5%), myopia (6.5%), keratoconus (4.3%), retinitis pigmentosa (4.3%), glaucoma (4.3%). Cone dystrophy, nystagmus, microphthalmus, and retinopathy were identified among 3.2% of the learners respectively. Ambloypia and disc hypoplasia were diagnosed among 2.2% of the learners respectively. Dislocated lens, choloidal atrophy, aniridia, Stephen Johnson Syndrome, and Coloboma were identified among 1.1% of the study population. From the data, albinism and cataract are the leading causes of low vision among the learners. The data is summarized on figure 2.

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Figure 2: Diagnosis of the learners
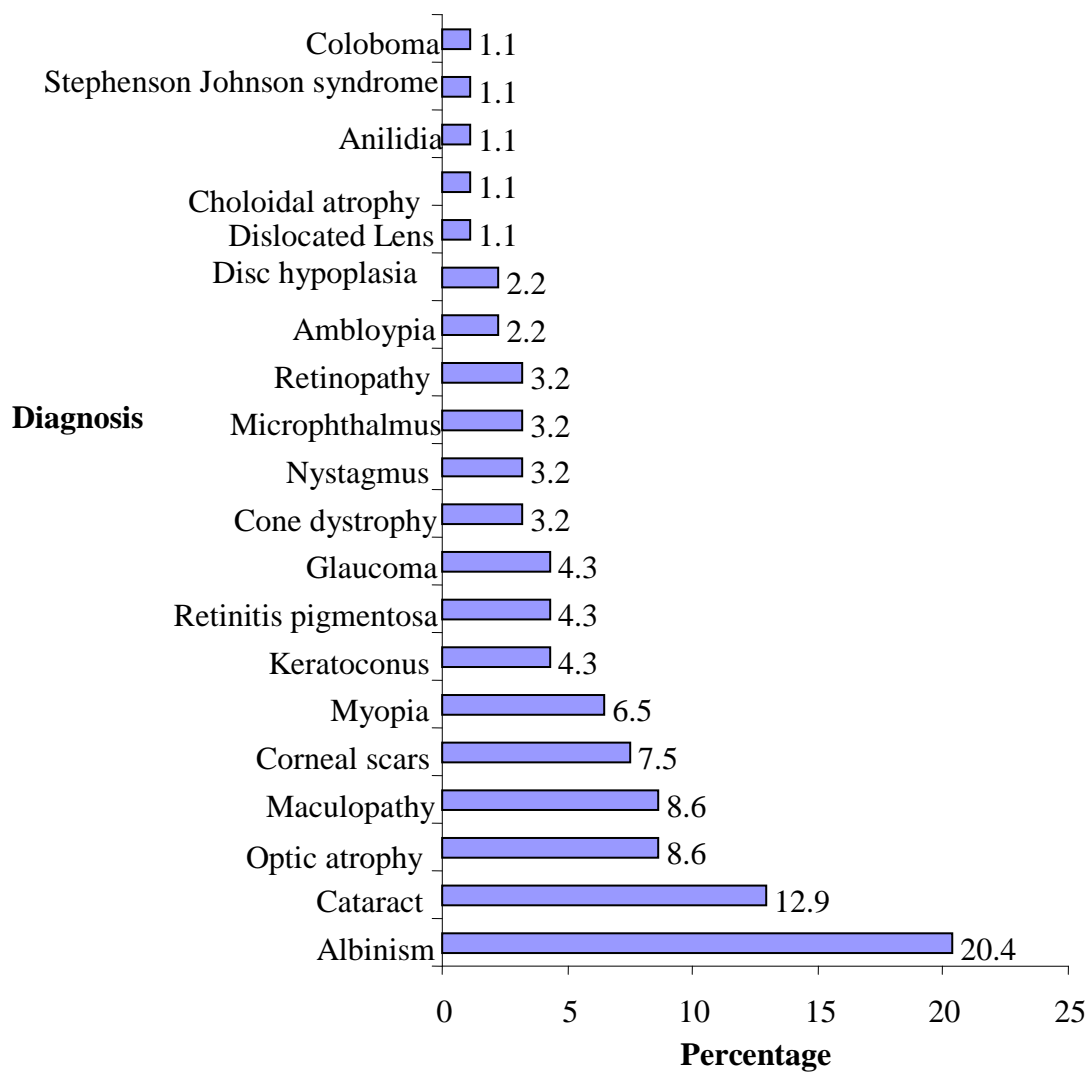
4.3.2 Nature of visual impairments

The nature of visual impairments for majority of the respondents ware overall blurred (60.2%). Eleven point eight percent (11.8%) suffered from central vision loss while (4.3%) had peripheral vision loss. The data is summarized on table 4.1.2.

Table 4.2: Nature of visual impairment of the learners

Nature of visual impairment	Frequency	Percentage
Over blurred	56	60.2
Central visual loss	11	11.8
Peripheral visual loss	4	4.3
Unknown	22	23.7

4.3.3 Visual fields

The finding on the Visual field revealed a proportionate number of learners had   both restricted and non-restricted fields of vision loss, as found out in 51.6% and 47.3% of the students respectively while one learner (1.1%) reported severe visual field loss. The data is presented on figure 3.

Figure 3: Visual field of the learners
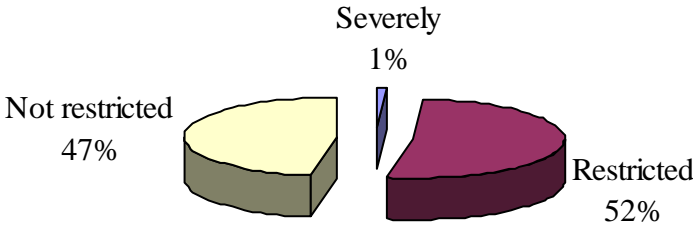
The analysis of the prognosis among the respondents was found to be stable in almost half of the respondents (47.3%), from a remarkable number it is unknown (38.7%) and 14% is deteriorating.

4.3.4 Category of low vision among the learners

Following the Kenyan low vision programme classification of low vision, 52.7% of the respondents were categorized as moderate low vision (category 3), while 47.3% had borderline low vision (Category 4). This is inconsistent with WHO visual acuity based categorization. The visual acuity measures of the respondent depicted 41.9 % as low vision 36.6% as severe low vision and 19.4% as blind.

4.3.5 Optical devices(magnifiers and telescopes) used by learners

Eighteen point eight percent (18.8%) of the learners used 2x telescopes for viewing distance visual information. A similar percentage (18.8%) used 4x telescopes. Majority of the respondents therefore used 2x and 4x telescopes. Other types of telescopes used included: 5x (3.2%) 6x (8.6%), and 8x (5.4%).

In terms of near distance magnifiers used, 18.3% used 2x stand magnifiers, 10.8% used 4x stand magnifiers. Majority of the respondents therefore used 2x and 4x stand magnifiers for reading and writing. Other types of magnifiers used include: 6x (8.6%), 5x (6.5%), 7x (3.2%), and 8x (2.2%). The data obtained is summarized on table 4.3.

Table 4.3: Optical devices used by the learners

Optical device	Type	Frequency	Percentage
Telescope for far distance viewing	2x	17	18.3
	4x	17	18.3
	6X	8	8.6
	8X	5	5.4
	5X	3	3.2
Magnifiers for near distance viewing	2x	17	18.3
	4x	10	10.8
	5X	6	6.5
	8X	3	3.2
	10X	2	2.2
	6x	8	8.6
	7x	3	3.2

4.4 Primary literacy medium and preferred literacy medium used by learners

The primary objective of this study was to investigate the medium of reading and writing the learners used. The questionnaire captured what the learners used as primary literacy media (medium of reading and writing currently using), and preferred medium (what the student would prefer to use). In addition the data captured both what the learner is currently using in secondary school and what the learner used while at primary schools.

The data indicate that while at primary school 46.2% used print with aid of magnifiers while 41.9% used print without aid of magnifiers, thus a total of 88.1% used print as the primary medium of reading and writing and only 11.8% used Braille. Print with and without the aid of magnifiers were therefore the primary media for learning used by majority of learners in primary schools.

While only 11.8% reported using Braille as the main medium in primary schools, majority of the learners (53.8%) reported that it was the main medium of reading and writing being used in secondary school. It is therefore interesting to note that the main medium most commonly

used in primary schools switches when the learners get to the secondary school. However, Print with aid of magnifiers remained the most preferred medium among 37.6% of the learners while 32.1% of the learners mostly preferred print without aid of magnifiers, making a total of 69.7% of those who would prefer print as literacy medium. Only 29% reported that Braille was their most preferred medium. The finding indicates there is a mismatch between the primary medium used in secondary school and the medium the learners would prefer to use. Tables 4.4 and 4.5 provide the distribution of the primary and preferred literacy media used by the learners while in primary and in secondary schools.

Table 4.4: primary literacy medium and preferred literacy medium

Literacy medium	Main medium of reading and writing used in primary school	Main medium of reading and writing currently using in secondary school	Most preferred medium of reading and writing
Braille	11(11.8%)	50(53.8%)	27(29%)
print with aid of magnifiers	43(46.2%)	21(22.6%)	35(37.6%)
print without aid of magnifiers	39(41.9%)	22(23.7%)	30(32.1%)
Dual/ multi-combinations of Braille and Print			1(1.1%)

Table 4.5: other literacy medium at primary and secondary school

| Literacy medium	Other medium of reading and writing used in primary school	Other medium of reading and writing currently using in secondary school	Other most preferred medium of reading and writing
Computer with large character display	9(9.7%)	9(9.7%)	20(21.5%)
Computer with voice synthesis	5(5.42%)	3(3.2%)	6(6.5%)
Digital/ recorded books	2(2.2%)	3(3.2%)	1(1.1%)
Audio tapes/ Speech output	9(9.7%)	1(1.1%)	2(2.2%)

Data presented on table 4.5 reveal that other media such as computer with large character display, computer with voice synthesis, digital/recorded books, and audio tapes/speech outputs were used though to a very low level both in primary and secondary school. However, it was noticeable that despite computer with large character display being used by 9.7% of the learners both at primary and secondary school level, 21.5% reported that it was the other most preferred medium of reading and writing. This finding implies that there is mismatch between preference and what is actually being used. However, unavailability of medium of reading and writing listed in the table 4.5 were reported by the respondent.

4.5 **The recommended literacy medium upon low vision assessment at primary and secondary school**

All the respondents had a clinical low vision evaluation and a medium of reading and writing recommended to them. Analysis of data obtained revealed that print without aid of magnifiers was recommended to 31.2% of the respondents at primary level and to 26.9% while at secondary school level. Print with aid of magnifiers was recommended to 50.5% of the respondents at primary level and 37.6% of the respondents when at secondary school level. Braille was recommended to 18.3% and 35.5% at primary and secondary level respectively.

Based on the analyses, print without aid of magnifiers and print with aid of magnifiers were the most recommended literacy media for learners with low vision at primary school level. However, there was an almost double increase in the percentage of respondents being recommended to use Braille at secondary school level as compared to primary school level. The findings seem to suggest that with increase in reading and writing demands on learners, the range of literacy media available for the learners is affected. However, Braille and print with aid of magnifiers remain favorable options. The data is summarized on figure 4.

Figure 4: The recommended literacy media upon low vision assessment
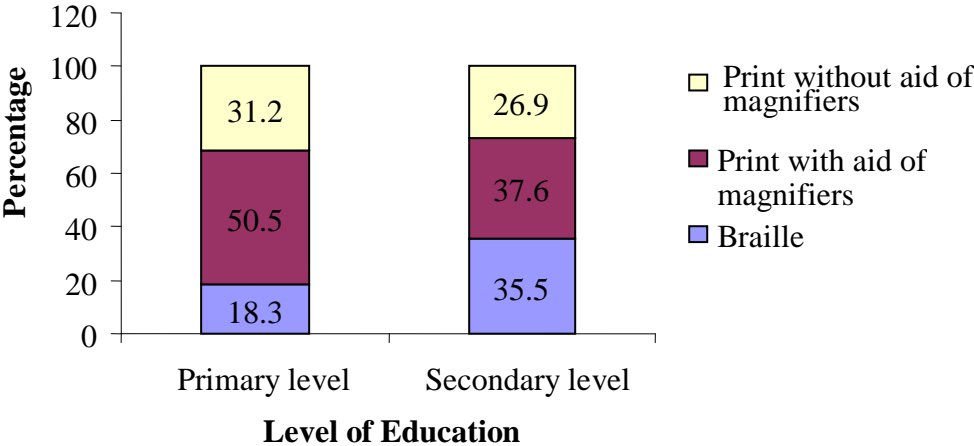
4.5.1 Other recommended medium at primary and secondary levels

Data obtained revealed that while there were other recommended literacy media upon clinical low vision assessment at primary and secondary school levels, computer with large character display was recommended to 12.9% of the respondents at both the primary and secondary school levels. The data is tabulated on table 4.6.

Table 4.6: Other recommended literacy media at primary and secondary school

Literacy media	Primary level	Secondary level
Computer with large character display	12.9%	12.9%
Computer with voice synthesis	4.3%	7.5%
Digital/ recorded books	4.3%	2.2%
Audio tapes/ Speech output	1.1%	
CCTV	6.5%	2.2%

4.5.2 Access to the recommended literacy medium

A cross tabulation was run between variable on the recommend medium of reading and writing and the main medium the learners is currently using (primary medium). Data presented on table 4.8 indicates that the incidence between recommended and use of main literacy media is 90.9% for Braille, 45.7% for print with aid of magnifiers and 64% for print without magnifiers. This implies that the incidence for which the use of recommended primary media is complex is 9.1% for Braille, 54.3% for print with aid magnifiers and 36% for print without aid magnifiers. The findings suggest that Braille was the most accessible recommended literacy media for learners with low vision as compared to other literacy media such as print with aid of and without aid of magnifiers. However, it is evident also that those learners recommended to use print with aid of magnifier has the highest level of deviation from the medium recommended and what the learners use. The data is summarized on table 4.7.

**Table 4.7: recommended literacy media vs. primary literacy medium**

			Main media recommended in secondary school upon low vision assessment		
			Braille	print aid with magnifiers	print aid without magnifiers
Main medium of reading and writing currently using in secondary school	Braille	Count	30	13	7
		%	90.9%	37.1%	28.0%
	Print with magnifiers	Count	3	16	2
		%	9.1%	45.7%	8.0%
	Print without magnifiers	Count		6	16
		%		17.1%	64.0%
Total		Count	33	35	25
		%	100.0%	100.0%	100.0%

This result generally indicates that there is a higher mismatch between the recommended and the primary literacy media in regard to print with aid of and without aid of magnifiers than for Braille.

4.6 Form of curriculum that learners use at secondary school

Two forms of curriculum were found to be used in secondary school; the adapted curriculum specifically adapted for the learners who are blind and regular curriculum; used in regular schools with ordinary learners (normally sighted). The learners were asked to indicate the form of curriculum that they use in secondary school. Thirty five point five percent (35.5%) reported that they used the regular curriculum while 64.5% were using the adapted curriculum. Majority of the learners with low vision were therefore using adapted curriculum. The findings are summarized on figure 5.

Figure 5: Form of curriculum that learners' use at secondary school
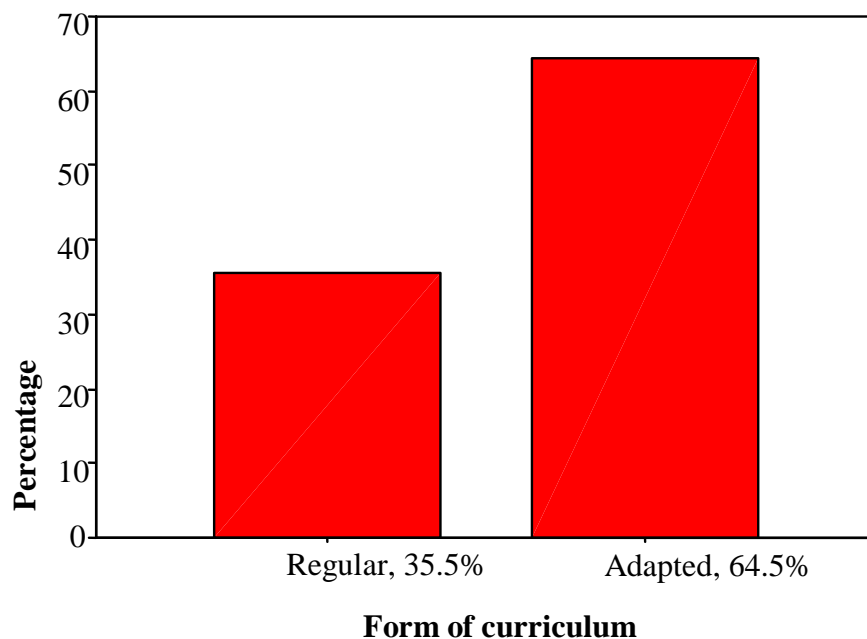
4.7 **Academic performance of the learners**

Data presented on table 4.9 shows that 12.9% of the learners performed above average, 61.3% were average, 22.6% were below average while 3.2% were performing poorly. Majority of the students (61.3%) were therefore average in their academic performance.

The academic performance of the learners is summarized on table 4.8 below.

Table 4.8: Average academic performance of the learners

Average academic performance	Frequency	Percentage
above average (B+ to A)	12	12.9
average (C+ to B)	57	61.3
Below average (C to D)	21	22.6
Poor (D- to E)	3	3.2
Total	93	100.0

4.8 **Factors that influence the learner's choice of literacy medium**

The questionnaire used (Caton, 1991) model to investigate factors that are pertinent to the choice the appropriate literacy medium. These included mechanical and social factors. An additional factor was adopted regarding the curriculum due to the issues related to different forms of curriculums offered in secondary schools for the learners with visual impairments in Kenya.

In order to determine the level of influence on specific factors on the learners' choice of literacy media, % score was derived for the core factors in the questionnaire.
The data obtained indicates that issues related to mechanical factors that is, comprehension, reading accuracy and coping with amount of academic work were main factors that influenced the choice at (66.7 -73.3%). Social factors that included the portability, learners' needs and desire as well as family and teachers' influence were equally higher at (54 – 57.8%). Peer and parent's influence played the least role in influencing learners' literacy medium. It is interesting to note that the teacher's advice and the form of curriculum the learners used prayed a great role as factors that influenced the student choice at 68.2% and 82% respectively. The results are presented in table 4.9.

Table 4.9: Factors that fluencies learners' choice of literacy medium

Factor	Percentage score
I find it difficult to comprehend what I read and write when I use the recommended literacy medium	73.3
I am slower in reading and less accurate when I use the recommended primary literacy media	72.5
I am slower in writing and less accurate when I use the recommended primary literacy media	69.2
The amount of academic work (assignments, notes taking) has contributed to my choice of primary literacy media	66.7
I experience fatigue when reading text books with standard print	57.8
I find it cumbersome to move around with materials I use for reading and writing	55.9
My Parent's advice influenced my decision on the media to use	54
My Teacher's advice influenced my decision on the media to use	61.9
Peer influence motivated my decision on the media to use	40.4
It is difficult to get materials I require to enable me use what I prefer as a primary literacy medium	68.2
The literacy media demand of the form of curriculum I undertake prohibits me from using my preferred literacy media	82.8

Other than the factors analyzed above; Chi Square test was computed for various selected demographic and visual variables in order to establish their level of significance in influencing of choice of literacy media. The data obtained is tabulated on table 4.10.

Table 4.10: Influence of various variables on choice of primary literacy medium

Variable	Chi Square (x^2)	df	p value
Form of curriculum used	16.952	3	.001
Main media recommended in primary school upon low vision assessment	23.303	6	.001
Main media recommended in secondary school upon low vision assessment	37.846	6	.001
Main medium of reading and writing used in primary school	31.863	6	.001
Category of low vision	12.924	3	.005
Near distance visual acuity	8.686	3	.034
Distant visual Acuity	15.954	9	.068
Type of primary school attended	11.704	6	.069
Diagnosis	68.611	57	.139
Nature of visual impairment	11.069	9	.271
Prognosis	7.346	6	.290
Age	10.258	9	.330
Visual fields	3.704	6	.717
Gender	1.298	3	.730
Average Academic Performance	5.371	9	.801

$p = 0.05$

Data from table 4.10 show that the following items had a p value of less than or equal to 0.05 i.e. $p \leq 0.05$ and therefore had significant effect on choice of the primary literacy media: form of curriculum used (x^2=16.952, df= 3, p=.001); main media recommended in primary school upon low vision assessment (x^2=23.303, df= 6, p=.001); main media recommended in secondary school upon low vision assessment (x^2=37.846, df= 6, p=.001); main medium of reading and writing used in primary school (x^2=31.863, df= 6, p=.001); category of low vision (x^2=12.924, df= 3, p=.005); and Near Distance Visual Acuity ($x^2$8.686, df=3, p=.034).

The following variables related to choice on the literacy media had a p value of more than 0.05 i.e. $p > 0.05$. The items therefore had no significant effect on choice of the main literacy media: Gender (x^2=1.298, df= 3, p=.730); age (x^2=10.258, df= 9, p=.330); nature of visual impairment (x^2=11.069, df= 9, p=.271); visual fields (x^2=3.704, df= 6, p=.717); type of primary school attended (x^2=11.704, df= 6, p=.069); Distant Visual Acuity (x^2=15.954, df= 9, p=.068); and average academic performance(x^2=5.371, df= 9, p=.801)

In summing up results obtained from the data analysis show that learners with low vision commonly used three types literacy medium namely Braille, print with aid of magnifiers and standard print. However, Braille was found to be the primary literacy medium used by majority of learners with low vision with 53.8% of the respondent indicating it is their primary literacy medium, while print with aid of magnifiers was used 22.6% and 23.7% used standard print. However, majority of the learners (69.7%) indicated preference of print whereas only 29% of the learners choose Braille as their preferred medium. From these finding it is evident that there is a high mismatch between the primary medium the learners use and what they would wish to use (preferred). Further the analysis identified various factors that influence the choice of literacy medium. These includes; social and mechanical factors, form of curriculum used, media recommended upon low vision assessment, main medium of reading and writing used in primary school, the Category of low vision and Near distance visual acuity.

5 Discussion of findings, conclusion and recommendation

This study investigated the primary and preferred literacy medium used by learners with low vision in a special secondary school for the learners with visual impairments in Kenya. In addition, factors that influence the learners' choice were also investigated. The discussion that follows takes into consideration the research questions guiding this study, findings obtained as well as personal experience. Further, attempts are made to draw parallels with previous studies presented in Chapter two. The study generated various findings. However, only key aspects have been singled out for discussion. These aspects are based on the two main research questions;

- What is the primary literacy medium used by secondary school student with low vision in Kenya?
- What salient factors influence the selection of the literacy media used by students with low vision Kenya?

5.1 Primary literacy medium

The first research question endeavored to establish the medium of reading and writing (literacy medium) used by learners with low vision in their education pursuit. They demonstrated their options across eight possible media available for use by persons with low vision. Results across the whole range of the sample indicated an inclination towards three traditional media that is; Braille (53.8%); print with aid of magnification (22.6%) and standard print (23.7%).

From the findings, it is interesting to note that, while the majority of the learners used Braille, most of them (69.7%) expressed their preference for print as the choice of their literacy route. The same trend was observed from the data regarding the medium the learners used while at primary school. A majority of the learners used print as their primary literacy medium with only a mere 11% reporting to have used Braille in primary school.

Although the main aim of the study was basically to establish the medium used in order to stimulate debate and more research in this field, the findings established a significant mismatch between what the learners actually used and what their preference is. Therefore, the

findings provide a basis for action by decision makers in the special needs education sector in Kenya and stimulate debate on the efficacy of the current practice in meeting the needs of the learners with low vision.

As observed above, a sizable percentage of learners reported using Braille as their primary medium of reading and writing. This view collaborates with a previous study conducted in special schools in Kenya that observed the same trend of educating learners with low vision using techniques appropriate to learners with severe visual impairments or who were totally blind - that is, Braille (Silver et al., 1995).

Although reasons behind the over reliance on Braille were not investigated in the study conducted by Silver, which is also the case with the present study, several factors were suggested as the reasons. Firstly, low vision services were fairly a recent development at that time and teachers in special schools may have found it difficult to adapt to the new concepts and to change their practices. Secondly, teachers may have construed by implication that the methods they have used in the past were wrong. Thirdly, in many schools for the blind, a significant proportion of the teachers were blind or visually impaired and it would be difficult for them to change to sighted methods of teaching. Fourth, few materials and facilities were available for low vision education.

The scenario has since changed as a low vision programme to promote the visual learning techniques for learners with low vision has been in existence for the last sixteen years. Therefore, it should be expected that most of the issues suggested above as responsible to the over reliance of Braille by learners with low vision have been addressed. Although the current study established that a relative percentage of learners are using print with and without aid of magnifier, a sign of departure from the previous message still stands. Learners who reported to use Braille were remarkably high. This is in contrast with studies carried out in other parts of the world (Walker, Tobim, & McKnnel, 1991; Council of Executives of American Residential Schools for the Visually Handicapped, 1990; Johnson, 1996; Spungin, 1989) that reported a remarkable decline of proportion of persons using Braille. What has emerged from the study suggests that factors cited in literature that have created a significant impact on changing attitudes toward Braille use: such as "sight saving" to visual utilization; and the increasing use of technology for access to print have not changed the attitude for Braille use among learners with low vision in Kenya.

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The issue of learners who are functionally blind in regard to use of Braille as their primary medium is relatively clear-cut, but for learners with low vision, Braille is only an option if the visual ability is not adequate to support the use of print. The finding from this study is therefore in contrast to evolvement of education practices for learners with low vision witnessed in most parts of the world.

Empirical based literature implicitly premises superiority of visual processing over tactile, arguing that visual processing is faster and more efficient than tactile learning and provides children an entry to mainstream culture and materials (Barraga 1964, 76, 2004; Koenig, 1992; Corn & Koenig, 1996). Where learners have the potential to use both tactile and visual sense, print may have many advantages over Braille and this is particularly pertinent for learners classified as category four who consisted of 47.3% of the respondents.

Further, learners who use Braille do not have access to a full range of resources compared to the mass of print materials available in numerous formats and range hence, over - reliance on Braille presents learners with low vision a challenge of holistic literacy acquisition, by denying them a chance of accessing many of the same visual materials as their sighted peers. When given a choice, having a learner to use print would sometimes be an easier solution for school administrators than attempting to provide Braille instruction and Braille materials that are rather expensive and not readily available. In addition, a classroom teacher could provide more immediate support for the literacy program than if the learner used Braille and would spend less time adapting materials and teaching Braille codes.

5.2 Factors that influenced the Learner's choice of literacy medium

Findings resulting from the first question portrayed an interesting observation on diversity of the learners with low vision in regard to the literacy medium they use or would prefer to use. Potentially, learners with visual impairments have a wide range of literacy media to choose from depending on various factors that come into play before a decision on the appropriate choice is made. The wide range of literacy media to choose from sometimes creates a dilemma in selecting the "most appropriate literacy media". Indeed, the issues of selection of appropriate literacy media for learners with low vision has been a subject of debate among

professionals, educators, teachers and the learners dating back to when the formal education for the visually impaired was instituted around 1800s (Koenig & Holbrook, 1989, 1991, 1995; Mangold & Mangold, 1989; Caton, 1991; Sharpe, McNear & Bosma, 1995). Nevertheless, the most important aspect in the selection process is to define the appropriate literacy medium within the dictates of the learner's needs and circumstances. Fundamentally, the appropriate medium should be the reading medium, which is most efficient in meeting the informational needs of the person with visual impairment.

What emerges from this study is that there were no formal criteria followed in the selection of the primary literacy medium. However, it was evident that clinical evaluation had been conducted for all learners and literacy medium recommended for each individual learner depending on the category. Nonetheless, a general picture of inconsistencies between what the learners used as a primary medium and what was recommended after clinical low vision assessment emerged.

The most notable inconsistency was among the learners who were recommended to use print with aid of magnifiers (see table 4.7).   This offers a reasonable assumption that learners did not find the devices helpful in accessing print hence, their preference of Braille to print. Scholarly literature presents rational arguments in support of efficacy of low vision devices but points out that for a learner to accept and attain efficient reading skills with the devices, instructions and practice must be provided (Gardner & Corn, 1984; Hatlen, 1996; Spungin & Ferrell, 1999). From this perspective it appears that issues regarding provision of devices in Kenya need to be investigated with a view to establishing their efficacy in supporting learners who require them to access print.

Other aspects relating to factors that influence the choice of literacy medium were explored using three broad categories described by Caton (1991), which involved (a) the child related factors that include, cognitive, age and eye condition (b) mechanical factors that included quantity and quality of assignments, ability to take notes in a chosen medium, reading rate and accuracy, reading comprehension, fatigue, physical dexterity and working distance from the page (c) social factors such as portability, availability and the family's or teacher's perception of the child needs. The result that emerged from these variables suggests that the three broad categories described by Caton captured majority of perspective of the learners concerning the selection of literacy medium. However, it was evident that the teachers'

advice and the form of curriculum the learner used contributed most to the decision on the primary medium learner choose. This view is supported by the results in this study regarding the form of curriculum learners' use (figure 4.5), which indicates that majority of the learners with low vision (64.5%) use adapted curricula for learners with visual impairments. According to (Haga, personal communication, August 30, 2010) the adapted curricula for learners with visual impairments in Kenya are specifically adapted to the needs for the blind learners and to qualify as a user, a learner has to use Braille as the primary literacy medium. Perhaps, this can reasonably explain why the use of adapted curriculum and teachers' advice are strong factors that influence selection of Braille as a primary literacy medium among learners with low vision. This phenomenon is an advancement -in the body of knowledge in low vision circles to note that leaner's with low vision in Kenya continue to access curriculum for those who are totally blind rather than be provided with a curriculum that meets their needs.

Attempts were made in this study to establish whether various selected demographic and visual variables had any significant effect on the medium the learners used as a primary medium. The variables included; form of curriculum used, medium recommended in primary school upon low vision assessment, medium recommended in secondary school upon low vision assessment, category of low vision, Near Distance Visual Acuity, gender, nature of visual impairment, visual fields, type of primary school attended, Distant Visual Acuity, and average academic performance. Interestingly, only a few variables have significant effect such as near visual acuity and the category of low vision. These findings portray a deviation from factors cited in the scholarly literature ((Koenig & Holbrook, 1989, 1991, 1995; Mangold & Mangold, 1989; Caton, 1991; Sharpe, McNear & Bosma, 1995). This phenomenon creates a misty cloud on the process that guides the selection of literacy medium for learners with low vision in Kenya.

5.3 **Concluding remarks**

This study investigated the literacy medium used by learners with low vision in Kenya and factors that influence the choice. It focused on the following research questions:
- What is the primary literacy medium used by secondary school student with low vision in Kenya?

- What salient factors influence the selection of the literacy media used by students with low vision Kenya?

Findings from the study reveal that learners with low vision have diverse preferences in regard to the reading and writing medium they use or would prefer to use. This may be due to a variety of factors that are unique to each individual. In addition, low vision is a broad term which captures a huge array of visual impairments, and each have a range of different implications on vision. Because of the unique characteristics of individual learners with low vision, no generalization about literacy medium is possible. However, the scenario observed in this study is likely to mirror the education practices in all other schools. This study therefore, is in congruence with views postulated by Koenig, Layton & Ross (1992), in that that generalization across the visually impaired population is not possible and it is important to look at an individual not a group when making important decisions about visual impairments. Consequently, a multidisciplinary team of qualified professionals should conduct a learning media assessment and objectively determine each learner's most efficient reading and writing media.

It emerged from this study that no such process was conducted for learners who participated in the study; hence it is reasonable to suggest that there exists a gap in education practices for learners with low vision in Kenya. This gap is perhaps the primary reason as to why majority of learners used Braille as their primary literacy medium, although they would have preferred to use print. In addition, the adapted curriculum requirement for Braille use as a criteria to qualify as user may have placed the learners in a dilemma on whether to follow visual or tactual route. As Koenig & Holbrook (1989) affirms, there are perhaps few decisions made on behalf of learners with visual impairments that are more crucial, yet subject to more confusion and controversy, than the decision regarding an appropriate reading medium.

Although, there is no magic recipe for determining the best reading and writing methods for the learners with visual impairments, the best professional practices specify that education decisions must be made by an educational team according to individual needs and abilities of each learner. These decisions must be based on broad information obtained from a systematic assessment procedure over time (Koenig & Holbrook, 1991).

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5.4 **Implications for further research**

In view of the findings in this study, several areas for further research emerged; some of these are highlighted below;

- This study only investigated the literacy medium used by learners with low vision in secondary schools. Future researchers may wish to extend it to include those in primary schools and higher institutions of learning.

- Majority of the learners' switched medium from print to Braille when they joined secondary school. This raises the question on the level of their Braille competency and literacy. Hence a study on Braille literacy among learners with low vision would be interesting.

- Majority of learners prescribed and provided with optical low vision devices formed a majority of those who prefer Braille as a primary media, an investigation on the efficacy of optical low vision devices from a Kenyan perspective would be worthwhile to confirm pertinent educational needs of this group of learners.

- There is need for studies on curriculum issues and education practices for learners with low vision in Kenya to assess their status in light of the changing world.

- The process of determining the learning media for learners with visual impairments seemed not to be mandated provincially or implicitly in the educational practices for learners with visual impairments. It would be interesting to investigate how the decision on the appropriate media is made for learners in Kenya to guide redress measures for the yawning gap in this area.

5.5 **Recommendations**

The main findings were outlined and discussed in the previous sections of this chapter. The findings obtained may be of importance to stakeholders in the education for learners with visual impairments in Kenya, more specifically to teachers, education administrators and

parents. Based on the outcome of this study, the following some suggestions relating to possible changes are put forth.

- Selection of the appropriate literacy medium through a formal process is a very crucial aspect on education for learners with visual impairments. Therefore, a criteria for learning media assessments through a multidisciplinary team of professionals need to be legislated and initiated for learners with visual impairments at all levels of education.

- Although in inclusive education practices, adapted curricula may be deemed to exclude learners who use such syllabus; learners with low vision may require curriculum specifically adapted to meet their unique educational needs which may differ with those of totally blind learners.

- Laws and policies that are in existence and address the education concerns of persons with disabilities should be made public and implemented as soon as they are formulated and approved so that the consumers reap the benefits without unnecessary delay.

- Inclusion calls for learners with disabilities to be educated alongside others. It may be necessary to review the role of special schools within inclusive education concept to establish their future roles from the perspective of learners with visual impairments.

- Teacher education at all levels should include aspects of low vision training to equip teachers with knowledge and skills on the unique educational needs for learners with low vision.

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Appendix 1: Questionnaire

Questionnaire by (optional) _____

Student no _____

Date: _____

SECTION A: STUDENTS' CLINICAL MEASURE

Clinical measure		Indicate measure		
1.	Diagnosis			
2.	Distant visual Acuity	RE:…..LE:……..BE:………		
3.	Near distance visual acuity	N………… at …………..cm		

Other clinical measures		☒ 1	☒ 2	☒ 3	☒ 4
4.	Nature of visual	overall	central vision loss	peripheral	Unknown
5.	Visual fields	severely	Restricted	Not	
6.	Prognosis	Stable ☐	deteriorating ☐	Unknown ☐	

7. Low vision category

1.Blind	Clinical ☐ perceived ☐	2.Severe low vision	Clinical ☐ perceived ☐	3.Moderate low vision	Clinical ☐ perceived ☐	4.Borderline low vision	Clinical ☐ perceived ☐

If moderate low vision list the type of optical device you use for reading

……………………………………………………………………………...

……………………………………………………………………………..

SECTION B: DEMORGRAPHICS/ RESPONDENT PROFILE

For question 1 to 5 please tick ONLY one box for the appropriate answer

1. **Which class are you in?**

Form I	☐	Form II	☐	Form III	☐

2. **What is you Gender?**

   Male   [   ]

   Female   [   ]

3. **What is your age?**   **12 - 15** ☐

   16 –19 ☐

   20 –23 ☐

   24 -27 ☐

   28- or older

4. **Which Form of primary school did you attended**

   Regular   [   ]

   Integrated   [   ]

   Special   [   ]

   Other *(please specify)* …….……………

5. **What form of curriculum do you use?**

Regular	☐	Adapted	☐	Any other Specify ………………	☐

6. **What medium of reading and writing did you use when in primary school? What do you use in secondary school? and which do you prefer most** *(Please indicate the medium by ticking the appropriate box)*

literacy medium used	Primary school	Secondary school	Most preferred
	☒ 1	☒ 2	☒ 3
Braille	☐ 1	☐ 2	☐ 3
print with aid of magnifiers	☐ 1	☐ 2	☐ 3
print without aid of magnifiers	☐ 1	☐ 2	☐ 3
Dual/multi-combinations (Please specify)………………………….			

Other medium used	Primary school	Secondary school	Most preferred
Computer with large character display	☐ 1	☐ 2	☐ 3
Computer with voice synthesis	☐ 1	☐ 2	☐ 3
Digital/ recorded books	☐ 1	☐ 2	☐ 3
Audio tapes/ speech output	☐ 1	☐ 2	☐ 3
Any other (please	☐ 1	☐ 2	☐ 3
CCTV	☐ 1	☐ 1	☐ 3

7. **What medium was recommended to you upon low vision assessment?**

(Please indicate the medium by ticking the appropriate box)

literacy medium recommended after assessment	Primary school	Secondary school
Braille	☐ 1	☐ 2
print with aid of magnifiers	☐ 1	☐ 2
print without aid of magnifiers	☐ 1	☐ 2
Dual/ multi-combinations (specify)………….....		

Other medium used	Primary school	Secondary school
Computer with large character display	☐ 1	☐ 2
Computer with voice synthesis	☐ 1	☐ 2
Digital/ recorded books	☐ 1	☐ 2
Audio tapes/ speech output	☐ 1	☐ 2
Any other (please	☐ 1	☐ 2
CCTV	☐ 1	☐ 2

8. **Academic performance**

Please indicate your average grade attained in the current academic	above ☒ A to B+	average ☒ B to	Below average ☒ C to D+	Poor ☒ D to E
Term I……………….	☐ 1	☐ 2	☐ 3	☐ 4
Term II------------------	☐ 1	☐ 2	☐ 3	☐ 4
Term III-----------------	☐ 1	☐ 2	☐ 3	☐ 4

SECTION C: FACTORS THAT INFLUENCED SELECTION OF PREFFERED PRIMARY LITERACY MEDIUM

Tick the box with the appropriate response according to your opinion

	Strongly disagree	*disagree*		*Neither agree nor disagree*	*agree*	*Strongly agree*
a. The amount of academic work (assignments, notes taking) has contributed to my choice of preferred literacy media.	☐	☐		☐	☐	☐
b. I am faster and more accurate in reading when I use the medium recommended to me after low vision assessment.	☐	☐		☐	☐	☐
c. I am faster and more accurate in writing when I use the medium recommended to me after low vision assessment.	☐	☐		☐	☐	☐
d. I find it easier to comprehend what I read and write when I use the medium recommended to me after low vision asssessment.	☐	☐		☐	☐	☐
e. I experience fatigue when reading text books with normal print.	☐	☐		☐	☐	☐
f. I am not comfortable with my working distance when I use standard print.	☐	☐		☐	☐	☐
g. I find it cumbersome to move around with materials I use for reading and	☐	☐		☐	☐	☐

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writing.						65
h. It is difficult to get materials I require to enable me use my preferred literacy medium.	☐	☐		☐	☐	☐
i. The form of curriculum I use prohibits me from using my preferred literacy media.	☐	☐		☐	☐	☐
j. My Parent's advice influenced my decision on the media to use.	☐	☐		☐	☐	☐
k. My Teacher's advice influenced my decision on the media to use.	☐	☐		☐	☐	☐
l. Peer influence motivated my decision on the media to use.	☐	☐		☐	☐	☐
m. any other (specify)						

End of questionnaire and thanks for your participation

Appendix 2: introduction letter from Univesitetet i Oslo

UNIVERSITY OF OSLO

Department of Special Needs Education

P.O.Box 1140, Blindern
N-0318 Oslo
NORWAY

Your ref:
Our ref: 03/10 SW/db
Contact person: Denese Brittain d.a.brittain@isp.uio.no

Visiting address:
Helga Eng's Building
3rd and 4th floor

Date: August 9. 2010

Telephone: + 47 22 85 80 59
Telefax: + 47 22 85 80 21

FACULTY OF EDUCATION

TO WHOM IT MAY CONCERN:

This is to certify that **NDUNG'U, Richard,** date of birth 07.04.1967, is a full-time student pursuing a course of study at the Department of Special Needs Education at the University of Oslo, Norway, leading to the degree of Master of Philosophy in Special Needs Education (M. Phil. SNE).

This is a continuous two-year programme run on the "sandwich" principle, which involves periods of study and field work/research in both Norway and the home country. The student is currently in the second semester of the initial study period in Norway and will be working on the collection of data and the writing of a thesis during the autumn semester 2010. This involves a period of field work in Kenya. The period of study will be completed at the end of May 2011.

The main responsibility for supervising the research, developmental work and thesis remains with the Department of Special Needs Education, University of Oslo, Norway. However, we would kindly request that the relevant authorities give the student the access required to the schools and educational establishments necessary in order to undertake field work and research. We would also be most grateful for any assistance that is afforded to the student which enables him to carry out this work, particularly the use of facilities such as access to telephone, fax, e-mail, computer services and libraries at the various educational establishments.

Yours sincerely

Ass. Professor Siri Wormnæs
Academic Head of International Master's Programme
Department of Special Needs Education

Institutt for spesialpedagogikk
Det utdanningsvitenskapelige fakultet
Universitetet i Oslo
Norge

Department of Special Needs Education
International Division
Faculty of Education
University of Oslo, Norway

Appendix 3: Research authorization NSD

Norsk samfunnsvitenskapelig datatjeneste AS
NORWEGIAN SOCIAL SCIENCE DATA SERVICES

Ivar Morken
Institutt for spesialpedagogikk
Universitetet i Oslo
Postboks 1140 Blindern
0318 OSLO

Vår dato: 01.11.2010   Vår ref: 24676 / 2 / RKH   Deres dato: Deres ref:

TILRÅDING AV BEHANDLING AV PERSONOPPLYSNINGER

Vi viser til melding om behandling av personopplysninger, mottatt 13.07.2010. All nødvendig informasjon om prosjektet forelå i sin helhet 26.10.2010. Meldingen gjelder prosjektet:

24676	*Literacy Media for Students with Low Vision*
Behandlingsansvarlig	*Universitetet i Oslo, ved institusjonens øverste leder*
Daglig ansvarlig	*Ivar Morken*
Student	*Richard Rukwaro Ndung'u*

Personvernombudet har vurdert prosjektet, og finner at behandlingen av personopplysninger vil være regulert av § 7-27 i personopplysningsforskriften. Personvernombudet tilrår at prosjektet gjennomføres.

Personvernombudets tilråding forutsetter at prosjektet gjennomføres i tråd med opplysningene gitt i meldeskjemaet, korrespondanse med ombudet, eventuelle kommentarer samt personopplysningsloven/-helseregisterloven med forskrifter. Behandlingen av personopplysninger kan settes i gang.

Det gjøres oppmerksom på at det skal gis ny melding dersom behandlingen endres i forhold til de opplysninger som ligger til grunn for personvernombudets vurdering. Endringsmeldinger gis via et eget skjema, http://www.nsd.uib.no/personvern/forsk_stud/skjema.html. Det skal også gis melding etter tre år dersom prosjektet fortsatt pågår. Meldinger skal skje skriftlig til ombudet.

Personvernombudet har lagt ut opplysninger om prosjektet i en offentlig database, http://www.nsd.uib.no/personvern/prosjektoversikt.jsp.

Personvernombudet vil ved prosjektets avslutning, 22.06.2011, rette en henvendelse angående status for behandlingen av personopplysninger.

Vennlig hilsen

for Bjørn Henrichsen   for Ragnhild Kise Haugland

Kontaktperson: Ragnhild Kise Haugland tlf: 55 58 83 34
Vedlegg: Prosjektvurdering
Kopi: Richard Rukwaro Ndung'u, Olav M. Troviks vei 66 Ho 402, 0864 OSLO

Appendix 4: Letter of research affiliation with Kenyatta University

KENYATTA UNIVERSITY

DEPARTMENT OF SPECIAL NEEDS EDUCATION
P.O. Box 43844 –00100 Nairobi,
Tel: 8710901 – 19 ext. 3512, Email: chairman-specialed@ku.ac.ke

Date: 7th Sept 2010

Mr. Richard Rukwaro Ndungu
P.O. Box 1780-00902
KIKUYU

Dear Mr. R. R. Ndungu

RE: YOUR REQUEST FOR AFFILIATION IN MASTER'S THESIS RESERCH
WITH KENYATTA UNIVERSITY SPECIAL NEEDS DEPARTMENT

This is in response to your letter dated 1st September, 2010 requesting for the above affiliation. The postgraduate board of the department of Special Needs Education has met and approved your request on 3rd September, 2010.

The Board has also appointed Dr. Michael M. Njoroge to be your supervisor who should guide you in proposal writing, data collection and report writing and all matters related to this affiliation.

The department wishes you good luck and success in your pursuit for higher education.

Thanking you.

Dr. Geoffrey Karugu
Chairman Postgraduate Committee, Department of Special Needs Education

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Appendix 5: Research authorization NCST

REPUBLIC OF KENYA

NATIONAL COUNCIL FOR SCIENCE AND TECHNOLOGY

Telegrams:"SCIENCETECH", Nairobi
Telephone: 254-020-241349, 2213102
254-020-310571, 2213123.
Fax: 254-020-2213215, 318245, 318249
When replying please quote

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

Our Ref:

Date:

NCST/RR1/12/1/SS/819/3

10th September 2010

Mr. Richard Rukwaro Ndungu
University of Oslo
NORWAY

Dear Sir,

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on *"Literacy media for students with low vision"* I am pleased to inform you that you have been authorized to undertake research in **Thika District** for a period ending *31st December 2010*.

You are advised to report to **the District Commissioner and the District Education Officer Thika District** before embarking on the research project.

On completion of the research, you are expected to submit **two** copies of the research report/thesis to our office.

P. N. NYAKUNDI
FOR: SECRETARY/CEO

Copy to:

The District Commissioner
Thika District

The District Education Officer
Thika District