ESTABLISHING BRAILLE PROFICIENCY LEVELS AMONG PRIMARY SCHOOL TEACHERS OF LEARNERS WHO ARE BLIND IN KENYA

STEPHEN MUSILA NZOKA
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DECLARATION

This research thesis is my original work and has not been submitted for a degree in any other University.

Signature: S. M. N  
Date: 12/10/2011

Stephen Musila Nzoka  

This thesis is submitted with our approval as University Supervisors.

Signature:  
Date: 13/10/2011

Dr. Rachel W. Kamau-Kang'ethe  
Senior Lecturer, Department of Early Childhood Studies  
Kenyatta University

Signature:  
Date: 14/10/2011

Prof. Thoedorus G. Groenewegen  
Professor of Educational Methodology and Technology  
Braeburn International University
DEDICATION

This thesis is dedicated to the Nzoka's family. I wish you well in all your endeavours and God's mercy.
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ACRONYMS AND ABBREVIATIONS

Bcr : Braille Codes Recognition and Reading
Bcw : Braille Codes Writing
BMN: Braille Mathematical Notation.
Btf/l : Braille Text Format and Layout
BP : Braille Proficiency
DST : Disproportional Stratified Technique
EACE: East African Certificate of Education
EFA : Education For All
FDG : Focus Group Discussion.
ICT : Information Communication Technology
KB : Kiswahili Braille
KCPE: Kenya Certificate of Primary Education
KCSE: Kenya Certificate of Secondary Education
KIE : Kenya Institute of Education
KNEC: Kenya National Examination Council
PST : Purposive Sampling Technique.
PWD: Persons with Disabilities.
UNESCO: United National Educational Scientific and Cultural Organisation
SEB : Standard English Braille
SPSS: Statistical Package of Social Sciences
SSI : Sight Savers International
Tgr : Tactile Graphics
VI : Visual Impairment
The purpose of the study therefore was to investigate Primary teachers’ abilities to read and write English and Kiswahili Braille grade 2, Braille mathematics notation and the creation tactile graphics which aid teaching and learning for learners who are blind. The study further investigated the extent to which the teachers guided their learners to master the Braille code and understand the tactile graphics. The study was guided by the rationale that a full understanding of Braille proficiency and literacy must be solidly grounded in theory that teachers’ professional practices are based on, and guided by, a sound body of Braille knowledge. In addition, the study was theoretically led by the view that reading, writing, speaking and listening are integrated language processes. This study used a descriptive survey design where the researcher tried to describe characteristics of subjects and to obtain information from representative information and from that sample; the researcher was able to present the findings as being representative of the population as whole. As a compensatory academic skill, Braille is a major literacy media for students with blindness. Indeed, the personal and professional lives of people who are blind highly depend on the value they give to Braille. As such, Braille must be taught effectively. The teachers must be trained and become fully competent Braille users. They must have a comprehensive understanding of Braille code and tactile graphics. In this sense, the major question that this study endeavoured to answer was whether the teachers of learners who are blind were competent Braille readers and writers for easy interaction with their learners in teaching and learning processes. Target population in this study was 268 teachers of learners with blindness in special schools for the blind and integrated programmes for the blind in Kenya. The study was conducted in five of the eight provinces in Kenya namely, Coast, Eastern, Nairobi, Rift Valley, and Nyanza. The reason for choosing this locale was for the availability of the targeted special schools. Two methods were used to select the population namely: disproportional stratified technique and the purposive Sampling technique. The researcher therefore purposively sampled 89 teachers who had been teaching in special schools for the blind and integrated programmes for not less than two years. Data for this study was collected through the use of four instruments: a questionnaire, an observation schedule, achievement tests and Focus Group Discussions (F.G.Ds). As each method had strengths and weaknesses, the instruments purposely complemented each other. The findings and suggestions of this study were envisaged to provide a more comprehensive view of the extent to which primary school teachers of pupils who are blind used Braille Grade II to teach their pupils. This knowledge would in turn, lead to a better understanding and hence effective interaction between the teacher and the pupils who are blind. The appropriate interaction between the teachers and their learners would in the long run lead to better academic performance by pupils who are blind. The findings of the study, however, showed that teachers generally lacked Braille proficiency and literacy. The teachers scored poorly not only in the achievement test administered to them but also demonstrated lack of Braille proficiency in guiding their learners to use Braille effectively in learning situations. The teachers who scored above 70% qualified to be Braille proficient. The study recommended that serious effort should be made to train the teachers in Braille so as to increase their ability to teach learners who are blind and thereby improve their academic performance.
CHAPTER ONE

1.0 Introduction

Standard English Braille (SEB) which consists of literacy and mathematical notation was introduced to East Africa after Second World War by establishing institutions. Thika Primary School for the Blind became the centre for the care and training of wounded soldiers. It is indicated that trainers and trainees then contributed much towards Kiswahili Braille development and came up with a system which is said to have varied from school to school and even from country to country (The East African Braille Committee, 1992).

Between 1960s and 1970s the need to unify the Kiswahili Braille code was expressed. This urge led to the founding of the East African Braille Committee which was charged with the responsibility of revising, organizing and writing a systematic Braille code which was used between 1971 and 1992 with other publications. Between 1971 and 1992, there were complains that Kiswahili Braille was not satisfying the needs of language development, Braille proficiency and literacy for the learners (Institute of Curriculum Development, Tanzania, 1992).

One major complaint was that many Kiswahili Braille letters were not used in accordance with the Standard English Braille (SEB). A similar practice was taking place in Kenya hence, the Sight Savers International (SSI) together with Royal commonwealth society for the blind (1992) organized a workshop on Kiswahili Braille development. The workshop was attended by all stakeholders of special educational needs from East Africa which managed to complete writing the first new Kiswahili primer that has significantly contributed to the present study.
1.1 Background to the Problem

This study was carried out when Kenya was still organized into administrative units such as provinces and districts. It was also a time when the Standard English Braille (SEB) was the primary method of communication and strategies for teaching learners with blindness at primary level all over the world (Rex, Koening Wormsley and Baker 1995; and Koech, 2000). The quality of Braille in primary institutions has been significantly declining over the years since all the stakeholders who included teachers, Head teachers, special needs educational administrators, curriculum developers, heads of special programmes and inspectors of schools lacked Braille proficiency and literacy. Consequently, this apparent lack of professionals’ Braille proficiency and mastery significantly affected the pupils performance enough to merit some educational research (Koech, 2000). Further, there were complaints of lack of Braille proficiency and literacy coupled by poor performance of learners who were blind (Kenya National Examination Council, KNEC, 2005).

The concern of the general public over this Braille proficiency was high in special schools as well as integrated programmes in regular schools. Braille proficiency and literacy was the agenda of every conference within the field Special Needs Education in Kenya (SNE). Learners with blindness needed functional and up to date reading and writing skills and ability to interpret accurately materials written in braille, tactile graphics and diagrams. Speech and listening could lightly be regarded to be effective ways in which to receive and to pass information to persons with blindness, but they would be more complementary and secondary to Braille reading and writing (Curry and Hatlen, 1988). This was particularly so in
light of the fact that majority of the learners who were blind terminated their education after primary level due to poor performance. Further, the study took place when the country was undergoing through tremendous changes constitutionally, educationally, socially and economically. As a result, everyone seemed worried about such issues as lack of jobs, global competitiveness, advent of Information and Communication Technology (ICT) to replace or at least improve Braille reading and writing for learners who are blind. Besides, the inadequacy of Braille reading materials was already identified as a problem and production of Braille paper and the cost of brailing books usable by learners with blindness was increasingly becoming slow and expensive (Koech, 2000).

In the face of all this, it seemed that ICT would alleviate the situation in that the computer was able to convert print to Braille and vice versa, or simply to read the material to the listener. This view was augmented by dwindling supply of reading Braille materials and understaffing of braille proficient teachers in the special primary schools and integrated programmes in regular primary schools in the country. Still, the movement towards integrated and eventual full inclusion was envisaged to prevent learners who are blind from receiving specialized instructions in reading and writing Braille. On the contrary, this study clearly stressed that children who are blind need specialized instructions to develop special skills in Braille in their primary school years and under teachers who were highly qualified in Braille literacy (Rex, et al. 1995). Consequently, the itinerant teachers as well as the regular classroom teacher were expected to be experts in all instructional phases of learners who were blind of which the teaching of Braille reading and writing was only a part of their education. It was against this
background that this study intended to investigate the teachers’ mastery of Braille grade 2 in English, mathematics and Kiswahili as selected core subjects of the primary school curriculum in Kenya. The study was guided by the rationale that full understanding of an issue such as Braille proficiency and literacy must be solidly grounded in theory that teachers’ professional practices are based on, and guided by, a sound body of Braille knowledge.

1.2 Statement of the Problem
By 2010, most research projects in Braille literacy had been carried out among learners in schools (Kershman, 1976, Okungu 2005). Among the areas already studied was Braille reading, Braille writing, tactile perception and attitudes towards Braille (Rex et al 1995). The area that appeared to have been overlooked then related to teachers in the field. Hence, there was need to bridge this knowledge gap by establishing Braille proficiency among the teachers in special schools and integrated programmes for learners who are blind.

Rex et al (1995), assert that children who are blind ought to be taught Braille early enough because they have as much a right to attain higher levels of literacy as those with normal vision. They affirm that Braille is the primary medium that can help the children to continuously grow in literacy. Braille is actually the medium of instruction learning and communication for learners who are blind. For the pupils to master Braille they need teachers who are efficient in it. It is because of this reason that this study was set to investigate mastery of Braille among primary school teachers of the blind learners in Kenya.
The Braille proficiency was based on the teachers’ mastery of the Standard English Braille Grade II; adopted grade II; mathematics Braille and Kiswahili grade II Braille. This is essentially what the pupils are expected to learn in order to perform in all the subjects as stipulated in the Kenyan Primary School Curriculum. Braille proficiency should facilitate effective teaching, learning, communication and positive attitudes for learners who are blind.

1.3 Purpose of the Study

This study was designed to investigate the Braille Proficiency among the teachers of learners with blindness in integrated programmes and special primary schools for the blind. The study’s ultimate purpose was to produce empirically-based knowledge, which would lead to a more comprehensive understanding of the phenomenon of educational instructions of pupils who are blind. A more comprehensive understanding would in turn hopefully suggest ways of increasing interaction between the teachers and the pupils which in turn would improve the creativity and performance of the pupils who are blind.

1.4 Objectives of the Study

The general objective of this study was to establish Braille proficiency levels among primary school teachers of learners who are blind in Kenya.

The specific objectives of this study were as follows:

(i) To determine whether teachers of learners who are blind could read and write Standard English Braille Grade 2;

(ii) To find out whether primary school teachers of learners who are blind could read and write Kiswahili Braille Grade 2;
(iii) To investigate whether primary school teachers of the learners who are blind could read and write Mathematical expressions in Mathematical Braille notation;

(iv) To determine whether primary school sighted teachers of learners who are blind could transcribe Kiswahili Braille passages into print passages and vice versa.

(v) To find out whether primary school sighted teachers of learners who are blind could read and transcribe an English Braille passage into print

(vi) To establish the competence of the teachers of the learners who are blind in guiding their pupils in understanding tactile graphics.

(vii) To compare the performance of male teachers with that of female teachers of the learners with blindness.

1.5 Study Questions

(i) How competent are the teachers in reading and writing Mathematical expressions in mathematics Braille notation?

(ii) How effective are the teachers in guiding the pupils to understand tactile graphics presentations?

(iii) What measures did the teachers put in place to improve competence in Braille by their learners?

(iv) To what extent are the teachers of the pupils who are blind able to read and write English Braille Grade II?

(v) How efficient are the teachers of the pupils who are blind in reading and writing Kiswahili Braille Grade II?
(vi) How often do the teachers of the pupils who are blind attend to the learners’ problem in writing or reading Braille?

(vii) How does the performance of male teachers compare with that of the female teachers of learners with blindness?

1.6 Significance of the Study

The findings of this study were envisaged to provide a more comprehensive view of the extent to which primary school teachers of the pupils who were blind used English Braille Grade II, Kiswahili Braille Grade II, Mathematics Braille Notation and Tactile Graphic to teach their pupils. This knowledge may in turn lead to a better understanding and easier interaction with the learners who are blind with the sighted teachers and the teachers who are blind. The appropriate interaction between the teachers may at long run lead to the development of more effective teaching and learning strategies for the pupils who were blind.

The study focused on the competence of teachers of the pupils who were blind in the use of Braille Grade II which is currently the most effective medium of learning and communication for the learners who are blind. Hence, the findings are may contribute to the improvements in educational policy, curricula and methods of teaching.

The findings will contribute to higher educational attainment since the research has suggested measures of ensuring greater students’ participation in the learning process. The attainment of higher level of education by these learners would lead to their employability, independence and hence their self-actualization.
Since it has suggested ways of improving Braille proficiency and hence better interaction between the teachers and the pupils, the study will generate crucial methods for implementation of inclusive education in Kenya.

1.7 Scope and Delimitation

In scope, this study focused on the extent to which teachers of the pupils who were blind used grade II Braille with their pupils. The study could however not attempt to investigate the teaching methods the teachers used because this would require a different type of study altogether.

The study focused on earners who were blind in Kenya and concentrated in special schools and schools with integrated programmes. The special schools six in number, and integrated programmes, twenty in number, were unevenly distributed in the country (See Chapter 3.4.) This meant that the physical distance between the schools was immense. Including all these schools in the study would have meant that the researcher spent a lot of time and money. The study would then not be cost-effective and the part-time researcher would not afford the required time to move all over the country. Due to this, the study systematically selected four special schools and four integrated programmes for the study.

1.8 Study Assumptions

This study was conducted under the assumptions that primary school teachers of the learners who were blind were:

1. Familiar with reading and writing Standard English Braille Grade II.

2. Able to read and write Kiswahili Braille Grade II.
3. Able to read and write Mathematical expressions into Mathematical Braille notation.

4. Able to direct their pupils in understanding tactile graphics.

1.8.1 Theoretical Framework.

This study was theoretically guided by the view that reading, writing, speaking and listening are integrated language processes. The four skills are interrelated components of language development and are inseparable communication skills to be taught in unity but not in isolation. This view is illustrated below by figure 1.

Figure 1.1 Language Communication

![Figure 1.1 Language Communication](image)


Fundamental to all aspects of language development, is the basic desire to communicate through language, whether by expressing (encoding) meaning through speaking and writing, or by receiving (decoding) meaning through
listening and reading. In either case, meaningful communication involves ongoing interactions between the speaker and listener (oral—aural language) and between the reader and writer (visual or tactile language). Most authorities agree that children, including those children with blindness, who enter school with well developed listening and speaking language skills, find it easier to learn reading and writing.

Thus, advocates of the language experience approach have supported the view that children should be taught to read words, sentences and stories that are based on their own oral language and real life experiences relevant to them (Van Allen, 1976).

1.8.2 Conceptual Framework

For the teacher of the learners who are blind to interact with the students who are blind effectively, the teacher needs to be familiar with Braille since this is the system through which the learners who are blind use to communicate (Rex et al 1995). The teacher should therefore try as much as possible to perfect learners Braille skills. In order to do this, the teacher ought to integrate the teaching of Braille with the teaching of subjects that are stipulated in the curriculum. It is important for the teachers to use as much as possible the interactive method of teaching so that the learners think and discover contraction, abbreviations and shortcuts as they learn concepts in various subjects.

According to Baker and Show-Baker (1992), Braille skills are best mastered as a learner uses Braille practically in reading and writing activities. However, this
does not mean that there is a single method of teaching that can be said to be the best in teaching Braille. This research has concluded that approaches for teaching Braille reading and writing are determined by the classroom teacher. The teacher therefore is the most important variable in determining effective instruction (Rex et al 1995). Consequently, the classroom teacher needs first to be proficient in these communication skills in order to effectively impart the same to the learners.

The current study was based on the belief that teaching Braille could greatly be improved by effective interaction between the teachers and the pupils in a teaching and learning process where the teacher concurrently taught Braille and other subjects. The teachers have three phases to consider in Braille teaching. These include: One, to take the beginners of Braille learning through pre-braille activities that involves the development of fine motor and gross motor skills. Two, Teaching of basic Braille skills that is reading and writing letters of alphabets and numerals and various contractions and abbreviations and three, perfecting Braille reading and writing skills through giving tasks to the learners in various subjects.

This study first established teacher's competence in using Braille and then endeavored to establish how teachers improve Braille competence in their pupils and then compared this with what the above theory suggests about the approaches of teaching Braille reading and writing in the learners who are blind. The Holistic language theory suggests that children should be taught how to read and write in the same natural way that they developed their oral language ability before they entered school and stresses the interrelationship between reading and writing (Goodman, 1976).
Perception and experience pervade all stages of teaching and learning Braille. Further, these Braille skills cut across the school curriculum and must be developed to their maximum and be integrated meaningfully with life skills by teachers as well as learners. Establishing literacy skills is a major focus of the early curriculum in primary school, and regular classroom teachers of young children devote a substantial portion of the school day to it (Rex et al, 1995). The theory of sensory channels modalities and media characteristics emphasizes the criteria that suit systematic presentation of material taught from simple to complex (Mugo, 2007). In this sense, the teachers, blind or sighted, would be expected to be proficient in Braille; Standard English Braille Grade II, Mathematics Braille Notation, Kiswahili Braille grade II, Music Braille, Science Braille and so forth. This will help the teachers to teach more systematically and effectively.
1.9 Operational Definition of Terms

Blindness – An educational definition of blindness implies that the learner must use Braille or aural methods in order to receive instruction (Kirk, Gallagher, Anastaclow 2000). Blindness is a condition whereby one is not able to use sight in carrying out activities.

Braille – Braille has often been defined as a system of reading and writing which is adequate in expressing all human ideas, feelings, concepts and which is internationally recognized as an authentic system of writing just as print. Its alphabet has 26 letters similar to print. However, this appears to be a gross understatement. Braille is not a language but a symbol system comparable to printed Roman script, Chinese script and Greek script among others. It is a way of making any number or letter tactile for a learner who is blind.

Disability - Disability refers to any incapacitating condition found in a person, which renders her/him somewhat unable temporarily or permanently, to use. Nevertheless, disability is not inability. A disability may be physical, cognitive, mental, sensory, emotional, and developmental or some combination of these. A disability is an umbrella term, covering impairments, activity limitations, and participation restrictions thus it is a complex phenomenon, reflecting an interaction between features of a person’s body and features of the society in which he or she lives.

Handicap - This condition refers to limitations inflicted upon an individual by the presence of impairment e.g vision, physical, mental or emotional.

Impairment: Is a problem in body function or structure; an activity limitation is a difficulty encountered by an individual in executing a task or action.
Integration - In this study, integration refers to the educational practice of establishing special units in regular schools in which children with disabilities learn with their sighted counterparts. Integration may occur at primary, secondary or tertiary levels.

Proficiency - Proficiency is used synonymously with competency. It has to do with degree of ability, knowledge, and skill confidence, excellence in performance, competence, quality and speed at a given task.

Reliability - Reliability has to do with being consistent, dependable, accurate and objective for example, reliable research should replicate similar results if carried out elsewhere under similar conditions.

Special School - These are institutions in which pupils who are blind stay and learn for a full school term without unnecessarily going home. They are also boarding schools.

Special Needs Education - This term refers to any education system that attempts to provide appropriate form of education for learners with special needs or disabilities which make normal teaching methods unsuitable for them. For example, learners who are blind would need the knowledge of reading and writing Braille while those learners who are deaf would need sign language as instructional strategies, respectively.

Visual Impairment – This is a visual condition which even with correction of the best eye adversely affects the child educational performance using sight. Visual impairment includes low vision and blindness. Kirk (2003) classifies visual impairment into three levels: moderate, severe and profound based on educational adaptations that are necessary to help children learn. The term visual impairment is an umbrella concept which includes blindness and all other degrees of visual loss such as low vision.
CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

The literature reviewed in this chapter relates to the introduction of special needs education to the country; development of special schools and integrated programs; the Braille code; uniqueness of Braille; purposes for teachers Braille proficiency and approaches to teaching learners who are blind. Throughout the chapter, the teaching of Braille and its importance as the major means of learning and communication by the learners who are blind is emphasized. The chapter concludes by pointing out the major gap of knowledge thus identified in the literature review. This is mainly lack of Braille proficiency and literacy by the teachers of learners who are blind in our special primary schools and integrated programmes.

The lack of Braille proficiency by the teachers of the learners with visual impairment is largely responsible for low academic performance by learners who are blind. This is because these learners entirely depend on Braille as the medium through which they acquire new dispositions as well as language development (Swenson, 1988 & Koech, 2000). Swenson notes that children who are blind do not certainly come to school with the same language experience and literacy competence as sighted children; and that they do not even have the basic concept that spoken language can be written down. Swenson advises that teachers of learners who are blind and family members must work as a team to provide direct, repeated and meaningful interactions with Braille literacy materials and events to children both at home and school.
The literature reviewed in this chapter relates to teaching of Braille and its importance as the major means of communication by the learners who are blind. The recommended standard of Braille worldwide is also discussed. The chapter includes the following: Importance of mastery of Braille by teachers of the learners who are blind; Literature on Internationally accepted standard of Braille; Comparison between use of print and use of Braille in acquisition of knowledge and skills and approach to the mastery of Braille Grade II.

2.1 Educational Development for Learners who are blind in Kenya

Education for children who are blind was introduced and sponsored by various churches within and without the country (Ndurumo, 1993). Among the churches was the Salvation Army which established Thika Primary School for the Blind in 1946 as a vocational center for rehabilitating those soldiers who had been blinded at the war. Eventually the center developed to a primary school by admitting younger children. The church later established Kibos Primary school for the blind in Nyanza 1961 and Likoni Primary school for the blind in Coast 1965.

The Catholic Church also established Igoji Primary School for the Blind in Meru-Eastern Province in 1958 and St. Oda Primary School for the Blind in Siaya Nyanza Province in 1961 and St Francis Primary School for the Blind in Kapenguria in Rift Valley Province in 1970s.

2.1.1 Special Schools

These special schools, six in number, are still under the sponsorship of their respective churches but under government management. All the teaching staff are
government employees. The schools draw pupils from all over the country. Majority of the pupils are blind and a few who are low visioned. They generally use Braille as their medium of instruction, learning and communication. They get 24 hour service in respect to their special individual needs, they would therefore be expected to perform quite well at the end of their primary level examinations which has not always been the case, KNEC (2005).

2.1.2 Integrated Units in Regular Schools

The development of integrated units for learners who are blind goes back to 1960s and 1970s. During these decade, several major studies (Hampshire, 1975; Kusajima 1974; Nolan and Kederis, 1969) were carried out in the West to compare print and Braille reading. These studies concluded that there were more similarities than there were differences in print and Braille reading. The researchers pointed out that 'these similarities provide justification for including learners who use Braille in classrooms with those who read print. The similarities in learning should ensure that regular class room teachers can assume a role in the literacy instruction of their students who are blind.' This idea was immediately recommended here in Kenya by commissions such as Gachathi (1976) and Kamunge (1988). They argued that educational integration made education more accessible to more children than were in special schools; that the children would be more socially accepted by their sighted counterparts; that the approach cut down educational expenses and that special schools could be left for those who were severely handicap only.
It was, however, noted that for early integration to be successful, institutions had to be staffed with specially trained teachers in Braille literacy; provided with teaching learning materials; facility and equipment among others. These provisions included: itinerant teachers: these were teachers who were trained in special needs education and visited regular schools to provide tutorials to regular teachers and remedial assistance to the learners who were blind. The services they offered included Braille reading and writing, orientation and mobility, daily living skills and academic subjects such as English Mathematics and Kiswahili. Children who were blind learned together with their sighted peers. Self contained classrooms: these were classes within a regular school which admitted learners who were blind. The class normally had a qualified teacher in special needs education including Braille proficiency. Children admitted in such a class could be day scholars (e.g. example Kilimani integrated unit) or boarders such as Kitui integrated unit. In any case, ‘children who are blind have as much a right to attain higher and higher levels of literacy as do children with normal vision and that Braille is the primary medium that can help them to continuously grow in literacy.’ (Rex et al, 1995). Certainly, without Braille, the persons who are blind would have no access to meaningful formal education.

2.2 Braille Code

The Braille code is a system of words, numbers or signs used for sending secret messages and its not a language as many take it to be. Each language develops its own Braille code just as it does print thus Braille is part of a language as shown below.
2.2.1 Braille

Definition: Braille may be defined as a reading and writing system in which tactile characters are portrayed graphically by embossing dots within units known as cells. Each cell consists of six dots which form two vertical columns of three dots as shown below.

```
    •    •
    •    •
    •    •
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Braille code, similar to print is easily read by running the fingers of the right hand along the dots by most readers who are blind. It is written on a six-key machine known as Braillewriter or with a stylus on a wooden or metal slate. Braille books are pressed from metal slates or computer Braille embossers. In either case, the dots on one side of the page do not interfere on those embossed on the other side of the paper.

2.2.2 Uniqueness of Braille to Learners who are Blind

As a system of reading and writing, Braille is not a language but a code universally recognized and used as such. All written languages have adopted it in expressing their words, ideas and concepts. For instance, there is English Braille, mathematics Braille, music Braille Chinese Braille, French Braille, German Braille among others. This is made possible by combining Braille letters or characters within two or more cells to function as a single unit; giving multiple uses of a character within a cell; or using special composite signs to represent different meanings. Rex et al (1995) summarizes these peculiar Braille contractions and abbreviations for learners who are blind as follows:-
• They give consideration in defining literacy that is unique to persons who are blind. Provide unique ways in which young children who are blind learn language, relate that language with Braille and develop an understanding of the purposes of reading and writing.

• Encourage unique perceptual aspects of reading and writing Braille.

• Give teachers unique features of teaching learners who are blind to read and write in Braille and to assess their Braille mastery of literacy skills.

• Give learners who are blind unique ability of using Braille literacy skills and other communication strategies to ensure their integration into the community and work place.

• As a communication strategy, Braille forms a unique curriculum for learners who are blind (Curry and Hatlen, 1988). For this reason, professionals who work with individuals who are blind have always viewed Braille proficiency and literacy as intergraded processes involving reading, writing, speaking and listening, and have realized that all these communication skills must be developed to their maximum and be integrated meaningfully with other life skills.

2.3 Standard English Braille Development

As a code, Braille owes its name from a French man, Louis Braille (1809-1852) who developed it. Below is short summary of how Standard English Braille developed to the present day.

1824: Louis Braille at the age of 15 develops a raised-dot reading system from a twelve dot code developed earlier by Captain B. Charles.
1829: Louis Braille published a dot-system of writing basing it on a cell of six dots.

1834: Louis Braille published a Braille method of writing words, music, and songs among others.

1854: the Braille code gets official and educational acceptance in the school at which he was educated and became a teacher later.

1870s/1900s: Braille arrival in England; and development of the British Braille.

1932: the treaty of London signed by representative of the English speaking countries makes revised English Braille grade two the medium of reading and writing for persons with blindness.

1940: introduction of Braille into Kenya and Tanzania by missionaries

1960s: the founding of East African Braille committee charged with responsibility of revising, organizing and writing a systematic Braille code to be commonly used in the region.

1992: The silver Hotel Braille workshop, attended by various institutions concerned with special needs education from Tanzania and Kenya, takes place to review Braille proficiency, language literacy and development. The results of the workshop lead to the writing of the Kiswahili prima which is used in the institutions of higher learning including universities of the two countries. This Kiswahili prima is however quite inadequate and requires urgent review. Certainly, teachers who attend university studies of special needs education do show significant inadequacy of Braille proficiency and literacy hence the need for the present study.
2.3.1 Braille Grades

The system consists of three grades:

*Grade one, Grade one and half and grade two*

**Grade one** consist of full word spelling. For example; WERE AND FAITH and numbers and figures. 1 2 3 4 5 6 7 8 9 10.

**Grade one and a half** consists of full spelling and word contractions

For example, the word WERE can be contracted by having W and ER(contract) and have E and the word FAITH can also be contracted as FTH. This grade is appropriately used in classes’ four to six.

Finally the word of **grade II** are entirely contracted and abbreviated

For instance the word WERE is contracted as lower G and the word FAITH becomes as FTH.

This grade is appropriately used in upper and beyond. Textbooks used in upper primary, secondary and tertiary levels of learning have to be printed or embossed to Braille grade two. Consequently, Standard English Braille grade two has been the standard literally code for specific and general literature and mathematics, including school curriculum and examination for learners who are blind. Among its advantages, Braille grade two makes ‘superior’ readers. (Rex et al, 1995, page 22); it’s the easiest to read and write an important aspect of speed. Indeed it’s quite easy to learn master and remember. With its contractions and abbreviations, Braille grade two reduces a lot of spelling and occupies a very short space. It was due to these reasons that this study was based on Braille grade two.
2.3.2 Standard English Braille Word Signs and Uses

Unlike print, the Braille code comparatively occupies space more than three times even after shortening it to Standard English Braille grade two. Hence, the code takes every opportunity to use word signs in order to save space, increase the reading speed among others. This has been done by dividing Braille word signs into upper and lower group signs.

The upper group word signs start with the alphabet. Here except for letters A, I and O the other letters stand for word signs: B-but C-can D-do E-every F-from G-go H-has J-just K-knowledge L-like M-more N-not P-people Q-quite R-rather S-so T-that U-us V-very W-will X-it Y-you and Z-as. (Ashcroft, 1991). Different letter combinations include (AND FOR OF THE WITH) combined to form ANDFOROFTHEWITH. Each of which must join the article A. example WITHA, FOR A, AND A Giving combined letters different meanings: examples SH-shall. CH-child. TH-this WH-which.

Using contracted word signs to form new words: Examples. Cheap, chase, shirt, them, whirl, outside, still, fed, ring, able, bed. The lower group signs, which begin from the middle of a Braille cell follow more or less same pattern as in upper group signs. These abbreviations include lower B for BE middle C for CON, bottom C for COM, lower D for DIS which are chiefly used to form the syllable of words such as began, combat and disaster. Further, EA, BB, CC, DD, FF and GG are also contracted. Lower E and lower I are also used to stand as words i.e. ENOUGH and IN respectively. Or as part of words such as GREEN and INSIDE.
Some of the lower word signs may be used to represent the whole word for instance Lower B for BE, lower G for WERE, lower H for HIS and lower J for WAS lower I for IN when not adjoined to any other word signs. Dot 5 also plays a significant part in Braille grade two when used at the beginning of a word. CHRIST, DAY, FATHER, GOD, HERE, JESUS, KNOW, LORD, MOTHER, NAME, ONE, PART, QUESTION, SOME, TIME, UNDER, WORK, and YOUNG. Similarly, Dots 4,5 combined with initial word signs to form new words, for example, These; which is Dot 4,5+The. Dot 4,5 U stands for Upon, and Dot 4,5W stands Word.

Dots four, five and six configuration may be adjoined to some Braille letters to form new words such as (dots 4,5,6 + c give cannot) (dots 4,5,6 + h give Had) (Dots 4,5,6 + m gives many) (dots 4,5,6 + s gives Spirit). (Dots Dots 5,6) are used to contract words that have LESS,NESS TION and ONG. e.g. useless, among, mention and usefulness.

Dots 4,6 maybe used to contract words containing Dots 4,6+D; OUND; GROUND.WOUND; Dots4,6+E;ANCE; IMPORTANCE4,6L=LESS;4,6+S;SION; DECISION, CONCLUSION; 4,6T; OUNT; ACCOUNT, AMOUNT.

Dots 5, 6 are also combined with letters to contract new words; examples

Dot 5, 6 + E represent -ENCE; IMPORTENCE, INNOCENCE;
Dots 5, 6 + G give -ONG: SONG, AMONG;
Dots 5, 6 + L give-FUL: WONDERFUL, CAREFUL;
Dot 5, 6 + N give-TION; MENTION;
Dot 5, 6 + s give-NESS: LIONESS, FAITHFULNESS
Dots 5, 6 + T give-MENT: MENTAL, COMPLIMENT;
Dots 5, 6 + Y gives-ITY: CITY, CORIOSITY
Dot 6 contract words containing ALLY and ATION e.g. NATION and REALLY.
Dot 6 + N gives -ATION: NATION, EXAMINATION; and
Dot 6 + y gives -ALLIES; REALLY, TALLY.

Finally, standard English Braille grade two uses short form words to represent whole word e.g. AB-ABOUT ABV-ABOVE, AC-ACCORDING, AF-AFTER, AFW-AFTERWARD, AG-AGAIN, AGSTAGAINST, ALMALMOST, AL-ALSO, ALT-ALTOGETHER, ALW-ALWAYS;

Lower B+C for BECAUSE, lower B+F for BEFORE, lower B+H for BEHIND, lower B+L for BELOW, lower B+N for BENEATH, lower B+T for BETWEEN, lower B+Y for BEYOND. Middle CCV for CONCIEVE, DCL-DECLEAR, DCV-DECEIVE, FT-FOOT, GD-GOOD, IMM-IMMIDIATE, MYS-MYSELF, PERCV-PERCEIVE, RCV-RECEIVE, RJC-REJOICE. Teachers who teach children who are blind are expected to be able to read and write Braille grade two proficiently so as to communicate with their learners more effectively.

2.4. Purpose for teachers’ Braille Proficiency and Literacy

The purpose for teachers Braille proficiency and literacy lie in the fact that educational success of a child who is blind requires that the teacher either has special training in special needs education or will receive help from a specially trained itinerant teacher and that all Braille and taped lesson materials be available to the learner (Scott, Eileen, Jan and Rojer, 1974), however, the use of itinerant
teachers in Kenya’s schools for the blind has remained in significant therefore the teacher, blind or sighted, teaching in any of these institutions, particularly primary schools, has no alternative but to be Braille proficient and literate, as well as all other area of special need education.

The Koech Education Report, (2000) advices that a policy be put in place which requires that any person wishing to teach children with blindness undergoes thorough training in reading and writing Braille and be certified as proficient prior to his/her appointment and that no person should be appointed to any supervisory, administrative or inspectorate positions directly affecting the learning of children with blindness. Similarly, Rex, et al 1995, points out that learners who are blind develop their basic literacy skills (reading and writing) in Braille in their primary school years. These pupils, therefore, need intensive and high quality instruction from professionals who know Braille, teach and are able to read it and write it. (Vacca, Vacca, and Gove, 1991).

Such teachers should be able to assess each pupil’s academic weaknesses and strengths so as to provide an appropriate teaching level to each learner. It’s essential that each school ensures adequate supply of tactile materials and equipment ready for use by teachers and pupils in the teaching learning process. Thus, Braille proficiency should enable the teacher to:-

- Motivate learners to develop Braille mastery of the three grades particularly Braille grade 2.
- Communicate directly and confidently with the learner in teaching process or in examinations.
• Mark the Braille examinations confidently identifying the child's academic abilities and weaknesses for later remediation.

• Develop positive attitude towards Braille literacy and the learners are blind.

• Transcribe teaching materials or examinations from print to Braille in the absence of a school Braille transcriber.

• Encourage learners to write in Braille such creative genres as personal diaries, compositions, stories and poems which the teacher can read for him / herself.

• Demonstrate the fact that the Braille code is a parallel medium to print and even a sighted person can read it.

• Work independently in teaching and marking pupils work without seeking Braille assistance from colleagues.

• Effectively assess and evaluate the work of the learners which leads to closer teacher-pupil relationship and confidence.

• Relate all subjects with Braille, writing be they arts or sciences as the media is able to serve any subject in the school curriculum.

• Through the knowledge and practice of reading and writing Braille, any teacher, blind or sighted, should feel born again, rehabilitated, self aware, integrated, learning and able to access education (Anderson, Hiebert, Scott, and Wilkinson 1985).

2.5 Approaches to Teaching Learners who are Blind

There are as many approaches to teaching just as there are as many teachers. Teaching is an art, not an inborn trait. Research studies to determine the most
effective approaches have concluded that there is no best method for teaching reading and writing skills but that the classroom teacher is the most important variable in determining the most effective teaching strategies (Bored and Dykstra, 1967). The following instructional approaches, however, are among the common adapted and used by majority of Braille teachers all over the world today.

2.5.1 The Basal Reading Approach

Basal readers or cards are instructional materials made to provide basic and fundamental basis to the learner. They would be prepared in the form of reading workbooks, textbooks, teacher's guidelines, scope and sequence chats of reading skills, tests and supplementary work books and practice reading materials. Old boys and girls students of Thika primary school still remember the card system, 24 of them, which enabled the learner who was blind to cover the alphabet and to read simple Braille materials without much effort.

The pupils are supposed to use the material daily while the teacher uses his guide on how to prepare and present the lesson. Although lessons in this approach tend to be teacher centered, he will be expected to test the learner for the next level. Initial instructions using these approach concentrates on the basic letter sound and tactile words so as to recognize all words and phrases easily. This practice later shifts to longer sentences in which syntax and semantics are stressed and words given meaning rather than individual letter sounds. Eventually, the emphasis is placed in the whole story. The aim is to enable the learner to construct meaning from the story. It is recommended here that the teacher using basal system and card readers or primas to instruct learners who are blind should monitor and
2.5.3 The Language Experience Approach

This approach focuses chiefly on the pupils' use of oral language and real life experiences as a basis for creating personalized reading materials. Okungu, 2005 in this approach, teachers would encourage learners to use familiar words and grammar to help them compose simple but meaningful stories, poems, songs and reports. Most authorities agree that children who enter school with well-developed listening and speaking language skills find it easier to learn to read and write (Baker and Shaw Baker, 1992).

In using this approach, the teacher may find the following suggestions useful:-

- Give vivid and stimulating experiences, topics and ideas that provide enjoyable content of the stories. Elicit oral, as well as written language from pupils that describes their experiences inductively.
- Braille the pupils' oral language on charts, if possible in order to motivate them all the more.
- The charts or copies must be accurately produced.
- Lead the pupils to read their written ideas. Such an exercise encourages them further.

2.5.4. The Literature Based Approach

This instructional approach originated from the old individualized reading approach which was based on sound teaching principles and ideas which could be used to supplement any reading program (Harley and Sanford, 1987). The approach can be used in Braille readers to supplement other teaching approaches or on its own. In either case, the approach ensures that:-
• The pupils read the stories which they enjoy.

• The pupils read at their own rate and level of comprehension.

• The pupils are free to choose when and where to read.

• A large supply of books which covers a wide range of the learners’ levels of understanding and taste must be ensured.


2.5.5. Whole Language Approach

This is a learner-centered literature approach which involves pupils in various forms of communication. Proponents of this approach stress that reading is essentially meaning centered and the meaning progresses from whole language units to their parts. And that reading and writing are part of integrated developmental language processes in which a pupil learns, reads and writes in the same natural way in which he developed his/her oral language ability before he/she entered school. Goodman (1976), Leu and Kinzer,(1991). Educators now agree that reading, writing, listening and speaking are components of interrelated language processes, not isolated components of language. Thus, instructional strategies may include daily reading and writing activities, co-operative learning, readers’ and writers’ workshops and independent reading and writing projects. Leu and Kinzer,1991 feel that the approach is similar to good teaching practices in which literacy activities occur in meaning contexts. Its also in their opinion that reading and writing do not necessarily have to receive equal emphasis in early literacy program.
Okungu (2005) observes that as the approach is learner centered in nature, it can be tailored to meet the needs of learners who are blind, to equip them with various literacy skills, knowledge and practice of reading and writing Braille literature. And that the approach permits the Braille reader to use his or her skills in psycholinguistic realm and with the use of syntactic and semantic cues to increase the rate of reading and comprehension. That the learner is likely to be motivated when the emphasis is put on meaning rather than skills. That a child who lacks linguistic and conceptual development is inexperienced in providing adequate schema and may not be able to read proficiently. And that as teachers try to help pupils to develop schema, they should apply the whole language approach.

2.5.6. Philosophical approach.

This study embraces the view stated by Bennaars (1998) philosophical assertion that ‘...no miraculous solution is offered to a typically human problem. Like a problem the solution is human too.’ In this respect, one may learn a lesson from the persons who are blind especially but have hope. In other words, what they often posses remarkably strong determination which stem from undoubted self-confidence and from faith in their own potential. The hope for the future of these persons who are blind is built on the acquisition of knowledge skills and attitude at the early age of their life. According to Scholl (1986), children who are blind delay in growth and development of milestones compared to the children without this handicap. Due to this, early intervention and in this case, in terms of education is imperative.
In terms of content, education is primarily concerned with knowledge, skills and values; this is in reference to the cognitive and normative dimensions of education (Bennars, 1998). In this case, education is often defined as the acquisition of knowledge skills and values. The concern here is the term ‘acquisition’. At this point, one is forced to ask two important questions: how does the learner who is blind acquire knowledge, skills and values? In addition, how does the teacher of the blind learner facilitate such acquisition? Here we explicitly inquire into the methods and the media used by the teacher that is the approach and or the type of orientation employed by the teacher to teach these learners.

In terms of the medium of communication, print system of education has been used widely and for a long time in education. According to Aduda, Wesonga, Otieno (2005) print media play a great role in education. They assert that the content of the print media convey the depth and emphasis it gives to specific issues such as education. This characteristic of print media is also pointed out by Mugo (2007) as he argued about the importance of using multi-media in teaching and learning process of the blind pupils. Curl (1972) stated that people learn 83% through hearing. Majority of teachers in Kenya are therefore trained to exclusively use visual media in their endeavor to impact new dispositions to the learners. Most of the books and other learning resources are written in print. The learner who is blind would therefore be easily forgotten in terms of production of learning media.

Inclusion of children with special needs into the mainstream of education has become an overwhelming trend in education (Alade and Eni-Olurunda, 2005). This calls for a serious and through preparation of teachers to effectively handle
these special needs children in regular classes. The teachers of learners who are blind must be aware of the system of communication that the learners who are blind use. In essence, something equivalent to print must be used to teach children who are blind. By doing so, the teacher will help the learners who are blind to compete equally with the fellow sighted peers.

According to Groenewegen (2005), Braille is equivalent to print despite the fact that it is slow in terms of reception speed. Therefore one can easily argue that blind people learn through touch. Just like printed material, Braille and other embossed or grooved material forms the most important teaching and learning media for children who are blind. In the same way the print media is emphasized, it should be so with the Braille material in helping children who are blind to acquire new dispositions. This is to say that the teachers of the pupils who are blind should be as competent in the use of Braille as the way the teachers of the learners who are sighted are in the use of print material. According to Rex et al (1995), learners who are blind develop their basic literacy skills in Braille in their primary school years. These pupils therefore need intensive and high quality instructions from professionals who know Braille and can teach, read and write it. It was therefore of paramount importance for this study to investigate the competence level of the teachers of learners who are blind in our primary schools.

2.6. Literature on Internationally Accepted Standard of Braille

For the purpose of easy conceptualization of the required standard of Braille, one needs to certainly go back to the invention and development of Braille. It is therefore systematic to define Braille and then look at a brief description of Braille
so that one can afterward confidently embark on the concept of the required standard to be taught to children who are blind

To begin with, it is important to note that Braille is a system of communication. It is a system of embossed dots which are formed using combinations of six dots that are arranged in two vertical rows of three dots each. Different arrangement of the dots forms the alphabet and other characters. They form a group of six dots numbered as follows:

```
  . . . . . .
 a b c d e f
g h i j k l
m n o p q r
s t u v w x
y z
```

Something worth noting here is that the letters of alphabet are also used to write the numbers. To distinguish between the letters and the numbers, one has to insert a numeral sign indicated as # sign here. Therefore the numerals are written as follows:

```
  1 2 3 4 5 6 7 8 9 0
```

Note that some basic punctuation marks are also indicated by the letters of the alphabet but written at the lower part of the cell as indicated above.
Persons who are blind read these dots by touching and feeling them by hand. Those who read through touch are referred to as touch readers. They use their fingers to identify the position and arrangement of dots. People who see do not need to use fingers while reading Braille instead they look and recognise the arrangement of the dots and know what is communicated. Each letter of the alphabet and all other print characters and symbols have their Braille equivalent depending on the arrangement of the dots.

Also, it is important to know that a single Braille character occupies a bigger space on the paper than print character. This means that Braille can be very bulky if contractions are not used to reduce the space. Because of this, there are sixty three (63) possible configurations, and each configuration has multiple uses. Indeed some have as many as four uses. To clarify the multiple uses of a single configuration, a complex set of rules has been established. To achieve literacy, a person who is blind must learn the uses of each configuration and the rules that govern it (Rex et al, 1995). A person who masters the 63 configuration in Braille and uses Braille intelligibly is said to be competent in Braille grade II. This is the recommended standard which all children who are blind must learn to be able to achieve academically (Rex et al, 1995).

There have been many complaints from the Kenya National Examinations Council (KNEC) about lack of competence in Braille by the learners who are blind. According to Koech (2000), the learners who are blind may find themselves failing in their examinations due to improper contraction (spelling) of words. This
problem definitively called for a research of this type to establish the cause of this problem and seek for viable solutions.

2.6.1 **Comparison between Use of Print and use of Braille in Acquisition of Knowledge, Skills and Attitudes towards Learning**

As already stated, comparative studies in 1960s and 1970s and experiences prove that there are more similarities than there are differences between Braille and print in their general use (Nolan and Kederis, 1969; Kusajima, 1974; Hampshire, 1975). Consequently, the acquisition of skills and knowledge by the learners who are blind and those that use sight is similar. The sense, used to read and to practice the skill is insignificant. Although one is aware that of all the senses, the sense of sight has greatest physical capacity than the sense of hearing and the sense of touch, the challenge for persons with special needs in regards to vision is to find adequate compensation for lack of sight.

Given that the ability to process information is of greater significance than the channel through which information is sent and received, a learner who is blind largely uses the sense of touch or sense of hearing to compensate for the lack of visual channel. Certainly, visual impairment does not impair a learner's ability to process information. In other words it does not interfere with the person's intellectual capacity unless one has a multiple disability for example visual and mental retardation. In their study about tactile perceptions, Rex al (1995), found out that there are three stages of memory i.e. the tactile sensory register, the short term memory register and the long term memory. The long memory stores the visual information processing system and also operate in the tactile information processing system. The findings also suggested a somewhat smaller sensory
register and greater decay in both the shorter memory and the sensory register. The ability to group or chunk symbols in working memory functions for persons who are visually as well as for sighted individual in the reading and writing processes.

Kusajima (1974), studied finger movements of Braille readers and concluded that visual and tactile reading was similar except for the fixation of the eyes and movement of the fingers respectively. He found out that those good readers who were visually impaired grouped letters perceptually into words, sentences and phrases just like good sighted readers. This means that despite factors that come about due to blindness, the learners who are blind should be able to compete fairly well with their sighted peers in learning situations. What should then be emphasized is the competence of the system of communication by the learners who are blind. In essence, the teacher of the learners who are blind should have competence in Braille in order to assist their students. This made the base for this study to investigate the competence of Braille among the teachers of primary school learners who are blind.

2.6.2 Approach to the Mastery of Braille Grade II

There is no intention here to discuss the basic activities for pre-Braille (digital Braille) and pre-mathematics Braille for counting and identification of mathematical shapes that new Braille learners have to get involved in. The assumption of this study was that the teachers of the visually impaired were able to read and write Braille. For one to master Braille at whatever level, a lot of
practice is required. It is obvious that for one to internalize any practical concept and perfect it, one has to take time to practice.

According to Baker and Showbaker (1992), Braille is not practised in isolation. Essentially Braille should be taught and practiced simultaneously with the teaching of other subjects because use of Braille cuts across the curriculum. In addition Braille is the medium of instruction, learning and communication. As the teacher of the learners who are blind teaches concepts in subjects such English the teacher concurrently identifies mistakes in Braille writing and reading and corrects the learner.

As stated earlier, Braille Grade II encompasses sixty three (63) configurations and sometimes a single configuration may represent four symbols. The implication here is that a person is bound to forget some of these configurations and symbols if the person does not keep on practicing. Of course, this applies to Braille users of whichever level. According to Okungu (2005), Braille users that stop using Braille for some time normally forget most of the Braille configurations. Due to this, for a teacher of the learners who are blind to refurbish the Braille skills interaction with other Braille users and with Braille materials is a compulsory practice.

Some of the teachers of the learners who are visually impaired, and especially the teachers who are sighted, depend more on print materials than Braille. In this sense, they have less time to practice reading and writing Braille as compared to their counterparts who are blind. Despite this, these teachers are expected to competently assist the learners who are visually impaired to master Braille. The
investigation of the teachers' competence in Braille by this study was therefore justifiable.

2.7 Science and Mathematics Braille Notations

Human brains are equipped to examine an experience and then branch laterally to a different application and apply similar tools and concepts. Once a child has learned to hammer a nail, the child can figure out how to use the hammer to pound on other objects. These lateral transfers are relatively easy to learn. They will occur faster if an adult shows the child how to do it or to recognize slightly different applications of the tool or concept.

Good teachers teach their children to develop rules of behaviour from experience. They teach about fair play, about sharing of possessions, and about respect for others. Teachers, in general, are less able to show their children how to extract principles from experience. The reason that mathematics and science are accorded such a fundamental place in education is that mathematics and science are devoted to the discovery of broad generalizations and principles (Gauzman, 1997). This is true to all learners. However, problems arise in the process of teaching the learners who are blind to master the mathematics and science concepts. The arrangement of Braille dots especially when the learner who is blind requires adding or subtracting for example in simultaneous equations or matrices poses a great problem. In addition, any pictorial presentation in science or in mathematics which is either embossed or grooved becomes difficult for the learner. The nature of Braille as discussed earlier in this research work is that it presents information in a linear manner. In this sense, the learner who is blind will be forced to trail a
line of dots several times for him/her to recognise the shape of a figure in mathematics.

The conventional approach to the teaching of science and mathematics concentrates on the mastery of the known principles. Conventional teaching does not concentrate on the mental processes that lead to the discovery of new principles. Conventional teaching in science and mathematics concentrates on lateral branching, that is, on how to apply these principles to various problems (Gauzman, 1997). In essence, students should be shown how to apply their scientific and mathematical skills to different problems. If the learners are not equipped with the skills of mastering the pictorial presentation in mathematics then it is impossible for them to apply the scientific and mathematics skills to solve their problems in their daily activities.

Despite the importance of competence in mathematics and sciences Braille, the learners who are blind face a range of versions in the mathematics and science notations. These may include Japanese mathematics Braille, Bharati Braille Code for Mathematics (India), Nemeth science, mathematics Braille notation, and Marburg mathematics Braille notation among others (Royal National Institute for the Blind (RNIB), 2001). This poses a problem for learners since the learners may be confused as the Braille notations differ from each other. This problem has however been addressed in Kenyan schools in which the English Braille notation is used. The English Braille notation is also used in United Kingdom and in Ireland. It was first designed in 1970, and a deeply revised version was published in 1987. This was also slightly revised in 2005. The concern of Education for all
(EFA) guarantees every child including those with special needs access to quality educational opportunities (UNESCO, 2003). The mastery of English Braille notations of mathematics and sciences by the teachers of learners with blindness was therefore a major concern in this study.

2.8 Conclusions

In concluding this chapter, the major gap that has been identified in the review of literature for this study is the need for teachers' Braille proficiency in the primary level of education. Lack of Braille competence adversely affects the academic performance of the learners who are blind because they wholly depend on Braille as a medium of instruction learning and communication through which they acquire new dispositions. It is worth noting that, Braille as a medium, of instruction is able to impart both science and mathematical knowledge and skills to the learner. It is also this fact that makes Braille run across the curriculum.
CHAPTER THREE
METHODOLOGY

3.0 Introduction
This chapter covers the following sections: study design, study variables, study locale, target population, sampling procedure and sample size, research instruments, pilot study, validity and reliability of the research instruments, data collection procedures, methods of data analysis and ethical considerations.

3.1 Study Design
This study used a descriptive survey design. A descriptive survey design attempts to describe characteristics of subjects or phenomena, opinions, attitudes, preferences and perceptions of persons of interest to the researcher (Bell, 1993). Moreover, a descriptive survey aims at obtaining information from a representative selection of the population and from that sample the researcher would be able to present the findings as being representative of the population as a whole (Mugenda and Mugenda, 1999).

3.2 Study Variable
Variables are key ideas that researchers seek to collect information to address the purpose of their studies (Creswell, 2005). Mugenda and Mugenda (2003) describe different classification of variables such as dependent, independent, intervening confounding and antecedent. This study considered the dependent and independent variables.
3.2.1 Independent Variables

An independent variable is an attribute or characteristic that influences or affects an outcome or dependent variable (Creswell, 2005). In this study, independent variables included causes affecting Braille proficiency of primary school Teachers of learners who are visually impaired in Kenya. Such variables included the type of school and its environment; the proficiency of the teacher in mastery of Braille as it pertained to reading and writing using Braille; attitude of teachers towards Braille; subject taught in relation to use of Braille; teachers’ preference to use print instead of Braille as a source of information; introduction of computer technology; poor use of speech and listening skills to learners who are blind; methods and teaching approaches used by the teacher and challenges faced by the teachers.

3.2.2 Dependent Variables

A dependent variable is an attribute or characteristic that is dependent on or influenced by the independent variable (Creswell, 2005). In this study, the dependent variable was on establishing Braille proficiency of primary school teachers of visually impaired learners in Kenya.

3.3 Study Locale

The study was conducted in five of the eight provinces in Kenya. The provinces included Coast, Eastern, Rift-valley, Central and Nyanza. A sample of four special schools and four integrated programmes were purposively selected for the study. The special schools included Thika Primary School for the Blind in Central Province which was used in the piloting of the study. The rationale for this was
because the researcher was familiar with the school. The other special schools included Likoni Primary School for the Blind in Coast province; Igoji Primary School for the Blind in Eastern Province and Kibos Primary School for the Blind in Nyanza Province for the actual research. The remaining two special schools included St. Oda School in Nyanza Province and St Francis School for the Blind Kapenguria in Rift Valley Province.

The four integrated programmes consisted of Kitui integrated programme in Eastern Province, Kajiado integrated programme in Rift-valley Province, Kilimani integrated programme in Nairobi Province and Kericho integrated programme in Rift-valley Province. These integrated programmes were purposively selected in that they were not very far apart and therefore they facilitated the researchers' mobility from Coast to Nyanza.

3.4 Target Population

The target population for this study was teachers of learners who are blind in both special schools and integrated programmes in Kenya. According to Kenya Society for the Blind (KSB, 2010) there were twenty integrated programmes scattered within the eight provinces. These included Kilimani, Our Lady of Mercy and Muthaiga Integrated Primary school in Nairobi Province; Joel Omino and Homa Bay Integrated Programmes in Nyanza Province, Kitui and Embu integrated programmes in Eastern Province; Kajiado, Ole Sangari, Trans Nzoia, Marigat, Mayaja, Kambi ya Juu, Kericho, Bomet and Menengai Integrated programmes in Rift Valley Province; Samburu, Turkana, Wajir, DEP, and Mandera Integrated
programmes in North Eastern, Chepsigot Integrated programme in Western and Nyeri Integrated programme in Central Province.

There were approximately 120 teachers in the six special schools and approximately 148 teachers in integrated programmes hence an approximated total of 268 teachers. (Sight Savers International, 2002).

3.5 Sampling Techniques and Sample Size.

3.5.1. Sampling Techniques

The researcher included both special and integrated programmes in the study. The rationale for this was to get a good representation of the population of the study. First, the purposive technique was used to select the number of schools for the study. The researcher selected 4 special schools of which one was used for pilot study (See 3.2) and 4 integrated programmes for the study. The fact that these schools are scattered throughout the country made them ideal for checking consistency in the information provided. In other words, the researcher wanted to determine whether the information provided in each case was consistent. Therefore, four special schools out of six special schools and four integrated programmes out of twenty integrated programmes were purposively sampled for the study.

Teachers in the integrated programs in the eight schools made up 30% of the total population of both residential and integrated programmes for the blind. According to Aray et al (1972), ten to twenty (10 - 20) percent of accessible population is
considered adequate in descriptive research. Since this was a descriptive study, 30% of the accessible population was considered adequate for the study.

The advantage of purposeful sampling lie primarily in the economy of gathering data from a small group with diverse characteristics and also in the case of comparing data when the sub-groups are of comparable size (Hall, 1967). In purposeful sampling, an equal number of cases were drawn from each sub-group regardless of the proportions in the population (Hall, 1967; Abramson, 1990 & Le Compte and Pressle, 1993). In this case, special schools and integrated programmes for the blind were adequately represented in the study. This sampling technique was appropriate because it ensured that in the analysis there were numbers of teachers large enough to make meaningful comparisons of sub-groups.

The researcher used purposive sampling technique to select the teachers among those in the special boarding schools and those in the category of integrated programmes for learners who are blind. This method was also used to select the respondents. According to Patton (1990) the purposive sampling method is useful when there are reasons to limit the sample to cases that are likely to be "Information rich in" with respect to the purpose of the study.

3.5.2 Sample Size

The researcher therefore purposively sampled 89 teachers who had been teaching in special schools for the blind and integrated programmes for at least two years.
The table below shows the distribution of respondents in terms of number, category, and gender in both special schools and integrated programs.

Table 3.1: Study Sample

<table>
<thead>
<tr>
<th>Type of Schools</th>
<th>Number per Category</th>
<th>Category of Teachers</th>
<th>Gender Representation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Sighted</td>
<td>V. L</td>
</tr>
<tr>
<td>Special school</td>
<td>68</td>
<td>50</td>
<td>18</td>
</tr>
<tr>
<td>Integrated</td>
<td>21</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>Programmes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>89</strong></td>
<td><strong>67</strong></td>
<td><strong>22</strong></td>
</tr>
</tbody>
</table>

*Source: Derived from Primary data.*

This period of time (2 years of teaching in a special school) was considered reasonable for the teachers especially those who had not gone through special education to have mastered substantial skills of interacting with the learners who are blind. This gave the researcher a better picture of the classroom interaction as the teacher endeavored to impart Braille skills to the learners.

The researcher therefore, purposefully selected Kitui Integrated programme in Eastern Province, Kilimani Integrated programme in Nairobi Province, Kajiado Integrated programme and Kericho Integrated programme in the Rift Valley Province. The four out of the twenty integrated programmes made twenty percent (20%) of the total number of the integrated programmes in Kenya.

For special schools category, the researcher purposively selected the schools depending on the time when the school was established. According to KIE, Thika Primary School for the Blind is the oldest (established in 1946) followed by Igoji Primary School for the Blind (Meru established in 1958). Kibos Primary School for the Blind which was established in 1961, followed by Likoni Primary School which was established in 1965 and the rest of the schools were established much
tests to measure the level of Braille proficiency and literacy of teachers. The criterion of performance was in this case based on brailling and transcribing English, Kiswahili and mathematical expressions in Braille Grade 2. All the respondents were subjected to these tests.

3.6.3 Observation Schedule
This instrument was used to observe how teachers taught and corrected Braille errors during class lessons. A category and sign system was used for recording the teaching of Braille or correction of Braille errors made by the learners. According to Groenewegen (1985) in pure category system blocks of time are assumed, and each time certain behaviour occurs during that block of time the appropriate behaviour is ticked off in the row, column, or box provided for that period of time. In this instrument, the time block of five seconds was used. Only one entry was made for every block of five seconds. In this case, the observer ticked in the appropriate box every time the teacher attended to teaching or correction of Braille in the class. The classroom observation was used to supplement the information on the questionnaires and to ascertain whether what the researcher observed in classroom was in line with what was indicated in the questionnaire.

3.6.4 Focus Group Discussion Guide
The researcher used this instrument to purposefully sample teachers who were considered to provide pertinent information related to this study. This data collection method was chosen to gather information from the teachers because it made it possible to obtain data in depth that would not have been possible through the use of questionnaire. Each Focus Group Discussion consisted of twelve
teachers. In total, eight sessions of Focus Group Discussions were in this case conducted.

The Focus Group Discussion guide had two parts. The first part acted as an ‘ice breaker’ while the second part of the Focus Group Discussion Guide had questions which addressed the objectives of the study.

3.7 Pilot Study

A pilot study was carried out at Thika Primary School for the Blind. Twelve teachers were purposefully sampled from class four to seven. Among the 12 sampled respondents, four taught Kiswahili, four taught Mathematics and four taught English. Each class produced three teachers (three teachers from class 4, three teachers from class 5, three teachers from class 6 and three teachers from class 7). The pilot study provided the pre-testing of the research instruments. The pre-testing aided in the determination of possible problems with regards to research instruments and thereby facilitated their modification and improvement. The questions which were found ambiguous were rephrased or replaced.

3.7.1 Validity of Research Instruments

Validity is a critical ingredient in research. A test or instrument has validity if it measured what it was designed to measure. Validity of the instrument in this study was assured through the use of two strategies:

Strategy One: After the researcher developed the questionnaire the relevant experts at Kenyatta University looked at the questions and made some corrections. Questions that were unclear or redundant were clarified or deleted.
Strategy Two: During the pilot study ambiguous questions were either deleted, corrected or replaced so as to minimize any confusion in meaning.

3.7.2 Reliability of Research Instruments

Reliability refers to the consistency of getting similar results at different times using the same instruments under similar conditions. For this study, reliability was based on the triangulation of methods. Different methods of data collection facilitated the gathering of similar and different types of data. Different informants allowed the researcher to obtain information from multiple perspectives. Triangulation hereby enhanced the accuracy and credibility of findings.

3.8 Data Collection Technique

The researcher obtained clearance from the Graduate School at Kenyatta University to collect data after which he proceeded to the Ministry of Higher Education, Science and Technology to obtain a research permit because its necessary for ethical issues that must be observed.

After obtaining the permit the researcher visited Likoni Primary School for the Blind, then Igoji Primary School for the Blind, then Kibos Primary School for the Blind, Kericho integrated Programme, Kilimani integrated programme, Kitui integrated programme and Kajiado integrated to collect the intended data.

The researcher spent 3 to 5 days in each of the above mentioned schools and programmes for the data collection. The duration taken in each case depended on
what was happening in a particular school or programme at the material time. For example, tests or co-curricula activities. Data collection consisted of giving questionnaires, achievement tests, observation and focus group discussion. (See 3.4).

3.9 Data Analysis

Data obtained from questionnaire for the teachers of the visually impaired was analysed using descriptive statistics which yielded percentages of how the participants' responded (See appendix A). The data was then presented in form of graphs and tables.

3.9.1 Method of Scoring

For the case of achievement tests, the tests were marked out of 100% according to which 70% and above score qualified the participant as Braille proficient. This grading system was adopted from the Kenya National Examinations Council (KNEC). Teachers of the learners who were blind had been graded using the same grading system in their college level of education and since research had not found any problem in using the system then the system was used in grading the performance by the teachers in this study. See figure 3.3 below.

**Figure 3.0: Performance Grading System**

<table>
<thead>
<tr>
<th>Grade</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>70 and above</td>
</tr>
<tr>
<td>B</td>
<td>60 - 69</td>
</tr>
<tr>
<td>C</td>
<td>50 - 59</td>
</tr>
<tr>
<td>D</td>
<td>40 - 49</td>
</tr>
<tr>
<td>E</td>
<td>30 - 39</td>
</tr>
</tbody>
</table>

*Source: KNEC, 2005*

In order for a participant to attain Braille proficiency level he/she was expected to Braille in Braille Grade 2 and use full contractions and abbreviations, correct
spelling, proper spacing, proper use of punctuation marks and read at expected
speed. In other words, observation of Braille rules was of key interest to the
researcher.

For the purpose of grading, the performance of the respondents was rated in
percentages. The number of errors made by the participant were subtracted from
the number of total words in the test and then multiplied by 100 to get error
percentage. The error percentage was then subtracted from 100% to get the
performance percentage (Rex et al 1995).

3.10 Ethical Consideration

Through the Graduate School of Kenyatta University, the researcher obtained a
permit from the Ministry of Education Science and Technology to collect the data
for the study. The researcher took three to five days to collect data from each
school under study. The researcher took the first day in each case to report to the
District Education Officer and to the school as required by research regulations.

On arriving at the school, the researcher first reported to the Head teacher to state
his purpose by showing his credentials to the Head teacher and creating good
rapport and to knowing the school program. This prior arrangement always
enabled the researcher and the head teacher to workout a plan which had to fit the
school program. For example, the researcher could visit a school during the time
of exams or interschool activities such as games. After working out such a plan,
the Head teacher would then introduce the researcher to the rest of the staff and
appoint his or her deputy to closely work with and assist the researcher to collect
the required data.
Since the schools and integrated programmes under study were far apart and involving expense in traveling and also in fear of posted data to be lost, the researcher persisted on and always managed to collect data 100%. Each of the remaining research days were divided into two sections, morning and afternoon in which the researcher, assisted by his Co-researcher and the assistant Head teacher, organized the sampled respondents for the intended task. After the last research instrument presentation the researcher always thanked the respondents in particular for the participation in the study and the entire school for the reception and welcome it had given to the researcher.
CHAPTER FOUR

DATA ANALYSIS, PRESENTATION AND DISCUSSION

4.0 Introduction

This chapter focuses on the presentation and analysis of the data obtained from the field. The information derived from the data collecting instruments is summarized in the form of frequency tables, graphs, charts and percentages. The presentation and analysis of the data were based on the following objectives of the study:

- To determine whether teachers of learners who are visually impaired can read and write Standard English Braille Grade 2;
- To find out whether primary school teachers of learners who were blind could read and write Kiswahili Braille Grade 2;
- To investigate whether primary school teachers of learners who are visually impaired could read and write Mathematical expressions in Mathematical Braille notation;
- To determine whether primary school sighted teachers of learners who are visually impaired could transcribe Kiswahili Braille passages into print passages and vice versa.
- To find out whether primary school sighted teachers of learners who were blind could read and transcribe an English Braille Passage into print.
- To establish teachers competence in the production of tactile graphics and in guiding their pupils in understanding the tactile graphics.
- To compare the performance of male teachers with that of female teachers of the learners with blindness.
4.1 Description of Personal Data

The tables in this section show the distribution of teachers according to the type of schools and their visual status. They also indicate how the teachers of the learners who are blind were distributed according to sex, professional qualification (grade) and years of teaching experiences.

Table 4.1: Sample of Teachers and their Visual Status in various Categories of Schools

<table>
<thead>
<tr>
<th>Category of schools</th>
<th>No. of teaching staff sampled</th>
<th>Visuals status of the sampled teachers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Special schools</td>
<td>3</td>
<td>34</td>
</tr>
<tr>
<td>Integrated programmes</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Total</td>
<td>7</td>
<td>45</td>
</tr>
</tbody>
</table>

Table 4.1, indicates that the largest sample of the teachers of visually impaired learners in both integrated and special schools, 68 were sighted (had no problem of the eyes). The table also indicates that the schools had more male teachers who were blind (13) compared to female teachers who were blind (9). Sighted teachers (51) were more than the teachers who were visually impaired teaching in the same schools (18). Something worth noting also is that more schools with integrated programs for the visually impaired were selected for the study and yet the total number of teachers sampled from these schools (21) was by far less compared to those selected from the special schools (68). The initial intention of this study was to sample quite a large number of the teachers but it was later realised that only few teachers in the integrated programmes taught learners who were blind. The researcher had no option but to use all of these teachers for the study.
Table 4.2: Teacher’s Professional Qualifications

<table>
<thead>
<tr>
<th>Professional qualification</th>
<th>P1</th>
<th>Diploma</th>
<th>Bachelor’s Degree</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
<td>Male</td>
</tr>
<tr>
<td>Special schools</td>
<td>7</td>
<td>10</td>
<td>12</td>
</tr>
<tr>
<td>Integrated programmes</td>
<td>6</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Total</td>
<td>13</td>
<td>18</td>
<td>21</td>
</tr>
</tbody>
</table>

Table 4.2 shows the teachers professional qualifications. The table indicates that 31 Teachers were P1, 36 of them were Diploma holders and 22 of them had Bachelor’s degrees in Special Needs Education. The table also indicates that for the P1 grade female teachers (18) were more than the male teachers (13) but for those teachers who had a diploma the number of male (21) exceeded that of the female (15). However, female graduate with the Bachelor’s Degree (14) were more than the male graduate teachers with the Bachelor’s Degree (8).

According to Rex et al (1995), for the teachers to effectively train their learners in Braille literacy, teachers need theoretical learning of Braille and a period of teaching experience. For this reason and for the purpose of this study, it was therefore imperative to establish the teaching experience of the teachers of learners who were blind. The researcher intended to sample those teachers who had a teaching experience of more than five years.
Table 4.3 below presents the teachers experience in teaching learners who were blind.

Table 4.3: Teacher's Experiences in Teaching the Visually Impaired

<table>
<thead>
<tr>
<th>Teaching period</th>
<th>5 years</th>
<th>6-10 years</th>
<th>11-15 years</th>
<th>16 years &amp; above</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>School category</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Special school</td>
<td>0</td>
<td>13</td>
<td>17</td>
<td>21</td>
<td>51</td>
</tr>
<tr>
<td>Integrated programmes</td>
<td>2</td>
<td>16</td>
<td>11</td>
<td>9</td>
<td>38</td>
</tr>
<tr>
<td>Total</td>
<td>2</td>
<td>29</td>
<td>28</td>
<td>30</td>
<td>89</td>
</tr>
</tbody>
</table>

From Table 4.3, only two teachers had a teaching experience of five years. Twenty nine (29) teachers had taught for six to ten years, twenty eight (28) teachers had taught for eleven to fifteen years while thirty (30) teachers had a teaching experience of sixteen (16) years and beyond. From the table, its observed that the two teachers who had taught for five years and below were teaching in integrated schools.

4.2 Teachers Competence in Reading and Writing English Braille

The first objective of the study was to determine whether teachers of learners who were blind could read and write Standard English Braille Grade 2. In this sense, an achievement test was administered to measure the extent to which the teachers could read and write English Braille including interpreting tactile graphics labelled in English. The test for English Braille first required the teachers to Braille the provided text into Braille grade two and at the same time Braille a Kiswahili text into Braille grade two. (See appendix-B)

The last part of the test requested that the teachers read a given Braille text. The first two parts of the test were scored depending on the number of errors the
respondent made. The last part of the achievement test which required teachers to read a text passage was timed and the errors the respondents made in reading recorded and deducted from the total. In this test, it was assumed that before attempting the test questions, each candidate had in store 100% correct answers. This meant that each error the respondent made reduced the total score by one mark. The total score the candidate earned were then converted into percentage. The mean grade of the respondent’s performance was then calculated. The following tables show the performance of the respondents in the test.

Table 4.4: Performance of Teachers in Brailing English Text

<table>
<thead>
<tr>
<th>Class</th>
<th>Midpoint (x)</th>
<th>Frequency (f)</th>
<th>Xf</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>22</td>
<td>6</td>
<td>132</td>
</tr>
<tr>
<td>25-29</td>
<td>27</td>
<td>4</td>
<td>108</td>
</tr>
<tr>
<td>30-34</td>
<td>32</td>
<td>8</td>
<td>256</td>
</tr>
<tr>
<td>35-39</td>
<td>37</td>
<td>8</td>
<td>296</td>
</tr>
<tr>
<td>40-44</td>
<td>42</td>
<td>12</td>
<td>504</td>
</tr>
<tr>
<td>45-49</td>
<td>47</td>
<td>9</td>
<td>423</td>
</tr>
<tr>
<td>50-54</td>
<td>52</td>
<td>2</td>
<td>104</td>
</tr>
<tr>
<td>55-59</td>
<td>57</td>
<td>7</td>
<td>399</td>
</tr>
<tr>
<td>60-64</td>
<td>62</td>
<td>3</td>
<td>186</td>
</tr>
<tr>
<td>65-69</td>
<td>67</td>
<td>4</td>
<td>268</td>
</tr>
<tr>
<td>70-74</td>
<td>72</td>
<td>3</td>
<td>216</td>
</tr>
<tr>
<td>75-79</td>
<td>77</td>
<td>1</td>
<td>77</td>
</tr>
<tr>
<td>80-84</td>
<td>82</td>
<td>2</td>
<td>164</td>
</tr>
<tr>
<td>85-89</td>
<td>87</td>
<td>2</td>
<td>174</td>
</tr>
<tr>
<td>90-94</td>
<td>92</td>
<td>1</td>
<td>92</td>
</tr>
</tbody>
</table>

\[ \sum f = 72 \]
\[ \sum fx = 3465 \]

The mean = 3465/72 = 48.125

Range = 92-22 = 70

From Table 4.4: the calculation of the mean score clearly showed that majority of the respondents scored less than the pass mark of fifty percent. Something worth noting also is that the number of respondents in this test was 72. This is less the number of the total sample which was 89 respondents. This means that 17
respondents did not respond to the test questions. The researcher wanted to find out the reason why the 17 respondents did not do the test and those who did not attempt the test explained that they were at the moment in the initial stage of learning Braille and therefore could not manage to answer questions from the test.

The second part of the test tested the respondent’s ability to transcribe the Braille text. Table 4.5 shows the respondents performance in the test.

Table 4.5: Teacher’s Competence in Transcribing English Text

<table>
<thead>
<tr>
<th>Class</th>
<th>Midpoint (x)</th>
<th>Frequency (f)</th>
<th>Xf</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29</td>
<td>27</td>
<td>6</td>
<td>162</td>
</tr>
<tr>
<td>30-34</td>
<td>32</td>
<td>2</td>
<td>64</td>
</tr>
<tr>
<td>35-39</td>
<td>37</td>
<td>4</td>
<td>128</td>
</tr>
<tr>
<td>40-44</td>
<td>42</td>
<td>13</td>
<td>481</td>
</tr>
<tr>
<td>45-49</td>
<td>47</td>
<td>10</td>
<td>470</td>
</tr>
<tr>
<td>50-54</td>
<td>52</td>
<td>5</td>
<td>260</td>
</tr>
<tr>
<td>55-59</td>
<td>57</td>
<td>6</td>
<td>342</td>
</tr>
<tr>
<td>60-64</td>
<td>62</td>
<td>2</td>
<td>124</td>
</tr>
<tr>
<td>65-69</td>
<td>67</td>
<td>14</td>
<td>938</td>
</tr>
<tr>
<td>70-74</td>
<td>72</td>
<td>3</td>
<td>216</td>
</tr>
<tr>
<td>75-79</td>
<td>77</td>
<td>1</td>
<td>77</td>
</tr>
<tr>
<td>80-84</td>
<td>82</td>
<td>3</td>
<td>246</td>
</tr>
<tr>
<td>85-89</td>
<td>87</td>
<td>2</td>
<td>174</td>
</tr>
<tr>
<td>90-94</td>
<td>92</td>
<td>1</td>
<td>92</td>
</tr>
</tbody>
</table>

The mean score was $\frac{4044}{72}=56.1$

Table 4.5 shows that seventy two (72) respondents transcribed the text. From the table, majority of the respondents (14) scored between 65 and 69 percent. However, quite a large number of the respondents, thirty five respondents scored 49 percent and below. The mean grade was 56.1. It can therefore be concluded that this was an average performance.

In the case of reading English Braille grade two, twenty eight (28) out of the total of eighty nine (89) respondents which in this case 32% was randomly selected to do the speed test. Two aspects of reading Braille passage were considered (i)
recognition of Braille codes and contraction and (ii) comprehension of the text. A combination of these determines the teacher's speed of reception through Braille. The assumption here was that the higher the mastery of Braille by the teacher the higher the speed of reception he/she would have. In this sense, the passage was set in a way that if the respondents managed to answer all the questions from the given passage correctly within the given time, then the respondent would be assumed to have read at a speed of one hundred and twenty (120) words per minute. It was further assumed that the teachers (because they were past the secondary level) should read at a faster speed compared to the secondary level students. However, the researcher opted to use the speed of secondary level in order to give consideration to different abilities among the teachers. According to Weaver, (1994), the speed of reception through Braille by secondary school level is approximately 120 words per minute.

To effectively assess the speed of reading especially in Braille, one has to consider several variables. One outstanding variable considered in this research was gender. The reason for considering this was based on the argument by Mondoh (2001) that females perform better compared to males especially in terms of speed texts in reading.

Another variable that was considered was the sight. The researcher was interested in comparing the Braille reading speed of the sighted teachers to that of the teachers who were blind. The reason for considering this was that mostly the sighted teachers depend more on print than Braille while those teachers who are blind depend more on Braille than print. Therefore, the sighted teachers lack
enough experiences in Braille. Despite this, it was interesting to find out whether this argument was true.

Accordingly, the respondents were subjected to a reading test (speed test). This consisted of two sections (i) One hundred multiple choice questions on the literally English Braille characters and (ii) assigned passage (study test) that was Brailled in contracted English Braille grade 2. The passage consisted of approximately three and a half Braille pages (25 lines per page, 28 cells lines.) The English passage was set in a way that did not require much knowledge of English by the respondents otherwise this would be testing for English instead of Braille competence. The teacher's speed of reception was hence analysed as presented in the following table.

Table 4.6: Teacher's Performance in Reading English Braille Grade 2

<table>
<thead>
<tr>
<th>Marks in % (x)</th>
<th>Frequency (f)</th>
<th>Xf</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>1</td>
<td>16</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>46</td>
</tr>
<tr>
<td>34</td>
<td>2</td>
<td>68</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
<td>38</td>
</tr>
<tr>
<td>41</td>
<td>3</td>
<td>123</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>43</td>
</tr>
<tr>
<td>44</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>53</td>
<td>2</td>
<td>106</td>
</tr>
<tr>
<td>57</td>
<td>1</td>
<td>57</td>
</tr>
<tr>
<td>58</td>
<td>1</td>
<td>58</td>
</tr>
<tr>
<td>62</td>
<td>1</td>
<td>62</td>
</tr>
<tr>
<td>69</td>
<td>1</td>
<td>69</td>
</tr>
<tr>
<td>71</td>
<td>3</td>
<td>213</td>
</tr>
<tr>
<td>76</td>
<td>3</td>
<td>228</td>
</tr>
<tr>
<td>83</td>
<td>1</td>
<td>83</td>
</tr>
<tr>
<td>88</td>
<td>2</td>
<td>176</td>
</tr>
<tr>
<td>89</td>
<td>1</td>
<td>89</td>
</tr>
<tr>
<td>Σf = 28</td>
<td></td>
<td>Σfx = 1563</td>
</tr>
</tbody>
</table>

Mean score was 55.6

Considering the grade obtained by the respondents as shown in Table 4.6, and considering the fact that 100% was taken to represent a speed of 120 words per minute, the speed of reading was therefore as presented in the following table.
Table 4.7: Speed of Reading in Words Per Minute

<table>
<thead>
<tr>
<th>Marks in % (x)</th>
<th>Frequency (f)</th>
<th>Wpm</th>
</tr>
</thead>
<tbody>
<tr>
<td>16</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td>23</td>
<td>2</td>
<td>28</td>
</tr>
<tr>
<td>34</td>
<td>2</td>
<td>41</td>
</tr>
<tr>
<td>38</td>
<td>1</td>
<td>46</td>
</tr>
<tr>
<td>41</td>
<td>3</td>
<td>49</td>
</tr>
<tr>
<td>43</td>
<td>1</td>
<td>52</td>
</tr>
<tr>
<td>44</td>
<td>2</td>
<td>53</td>
</tr>
<tr>
<td>53</td>
<td>2</td>
<td>64</td>
</tr>
<tr>
<td>57</td>
<td>1</td>
<td>68</td>
</tr>
<tr>
<td>58</td>
<td>1</td>
<td>70</td>
</tr>
<tr>
<td>62</td>
<td>1</td>
<td>74</td>
</tr>
<tr>
<td>69</td>
<td>1</td>
<td>83</td>
</tr>
<tr>
<td>71</td>
<td>3</td>
<td>85</td>
</tr>
<tr>
<td>76</td>
<td>3</td>
<td>91</td>
</tr>
<tr>
<td>83</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>88</td>
<td>2</td>
<td>106</td>
</tr>
<tr>
<td>89</td>
<td>1</td>
<td>107</td>
</tr>
</tbody>
</table>

\[ \Sigma f = 28 \]
\[ \Sigma fx = 970 \]

Mean is \( \frac{970}{28} = 34.6 \)

From Table 4.7, the respondents read at different speed. None of the respondents was able to read at the preferred speed of 120 words per minute. Only four respondents were able to read at a speed of more than 100 words in a minute with the highest reading at a speed of 107 words per minute. Nine out of the 28 respondents (32%) read at a slow speed of less than fifty (50) words per minute. The slowest respondent was able to read only nineteen (19) words per minute. On average the respondent read at the speed of 35 words per minute.

It is possible to illustrate this data in a more precise way by considering the various categories of the respondents as presented in the frequency Table 4.8.

Table 4.8: Words Calculated Per Frequency

<table>
<thead>
<tr>
<th>Words per minute</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>9</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Total
From the table, out of twenty eight (28) respondents twelve (12) read at a speed of less than sixty (60) words per minute. This is quite a slow speed. Only four respondents were able to read more than one hundred (100) words in a minute. From the table, the respondents read at an average speed of forty one (41) words per minute.

Table 4.9: Sighted and Blind Teachers Speed of Reading English Braille Comparison

<table>
<thead>
<tr>
<th>Words per minute</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Blind male</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Blind female</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>14</td>
</tr>
<tr>
<td>Sighted male</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>14</td>
</tr>
<tr>
<td>Sighted female</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

From the table 4.9, the fastest sighted male teacher was able to read at a speed of 68 words per minute while the fastest female sighted was able to read at a speed of ninety one (91) words per minute. The two fastest male blind respondents were able to read at a speed of more than one hundred (100) words per minute with the fastest reading at a speed of 106 words per minute followed by the one who read at a speed of 100 words per minute. In the female blind category, the fastest
respondent managed to read at a speed of 107 words in a minute followed by the second fastest who read at a speed of 106 words per minute.

4.3 Teachers’ Competence in Reading and Writing Kiswahili Braille

The second objective of this study was to find out whether the teachers of the blind learners were competent in reading and writing Kiswahili Braille. The test required that the respondents’ transcribe a Kiswahili Braille text and also Braille a Kiswahili print text. In addition, the respondents were subjected to Kiswahili reading test. Just as in the test for English Braille proficiency, the scoring of the test was done depending on the error made by the respondent. It was assumed that before attempting the test questions, each candidate had in store 100% correct answers. This meant that each error the respondent made reduced the total marks by one mark. The total marks the candidate earned were then converted into percentages.

The mean grade of the respondent’s performance was then calculated as presented in the following tables:
Table 4.10: Performance of Teachers in Brailing Kiswahili Test

<table>
<thead>
<tr>
<th>Class</th>
<th>Midpoint (x)</th>
<th>Frequency (f)</th>
<th>Xf</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>22</td>
<td>9</td>
<td>154</td>
</tr>
<tr>
<td>25-29</td>
<td>27</td>
<td>8</td>
<td>243</td>
</tr>
<tr>
<td>30-34</td>
<td>32</td>
<td>12</td>
<td>256</td>
</tr>
<tr>
<td>35-39</td>
<td>37</td>
<td>10</td>
<td>444</td>
</tr>
<tr>
<td>40-44</td>
<td>42</td>
<td>6</td>
<td>420</td>
</tr>
<tr>
<td>45-49</td>
<td>47</td>
<td>4</td>
<td>282</td>
</tr>
<tr>
<td>50-54</td>
<td>52</td>
<td>3</td>
<td>208</td>
</tr>
<tr>
<td>55-59</td>
<td>57</td>
<td>5</td>
<td>310</td>
</tr>
<tr>
<td>60-64</td>
<td>62</td>
<td>2</td>
<td>134</td>
</tr>
<tr>
<td>65-69</td>
<td>67</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>70-74</td>
<td>72</td>
<td>1</td>
<td>77</td>
</tr>
<tr>
<td>75-79</td>
<td>77</td>
<td>1</td>
<td>82</td>
</tr>
<tr>
<td>80-84</td>
<td>82</td>
<td>2</td>
<td>174</td>
</tr>
<tr>
<td>85-89</td>
<td>87</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\[ \Sigma f = 70 \]
\[ \Sigma fx = 2787 \]

The mean score was \( \frac{2784}{70} = 39.7 \)

From Table 4.10 above, a total number of seventy (70) respondents sat for the test. This number was less than the total sample of eighty nine teachers (89) that were expected to act as respondent for this study. When asked, the remaining nineteen (19) members freely responded that they did not know Kiswahili Braille and that is why they did not want to attempt the questions in the Kiswahili test. Majority (17%) of the respondents who did the test twelve (12) scored between thirty five and thirty nine percent. The mean score was thirty nine point seven (39.7%).

From Table 4.11 below, seventy (70) respondents sat for the Braille transcribing test. Majority of them thirteen (13) scored thirty five to thirty nine percent. The mean score was 42.4.
Table 4.11: Performance of Teachers in De-Brailing Kiswahili Test.

<table>
<thead>
<tr>
<th>Class</th>
<th>Midpoint (x)</th>
<th>Frequency (f)</th>
<th>Xf</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>22</td>
<td>7</td>
<td>154</td>
</tr>
<tr>
<td>25-29</td>
<td>27</td>
<td>8</td>
<td>216</td>
</tr>
<tr>
<td>30-34</td>
<td>32</td>
<td>7</td>
<td>224</td>
</tr>
<tr>
<td>35-39</td>
<td>37</td>
<td>13</td>
<td>481</td>
</tr>
<tr>
<td>40-44</td>
<td>42</td>
<td>9</td>
<td>378</td>
</tr>
<tr>
<td>45-49</td>
<td>47</td>
<td>8</td>
<td>376</td>
</tr>
<tr>
<td>50-54</td>
<td>52</td>
<td>8</td>
<td>418</td>
</tr>
<tr>
<td>55-59</td>
<td>57</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>60-64</td>
<td>62</td>
<td>4</td>
<td>248</td>
</tr>
<tr>
<td>65-69</td>
<td>67</td>
<td>2</td>
<td>134</td>
</tr>
<tr>
<td>70-74</td>
<td>72</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>75-79</td>
<td>77</td>
<td>1</td>
<td>77</td>
</tr>
<tr>
<td>80-84</td>
<td>82</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>85-89</td>
<td>87</td>
<td>2</td>
<td>174</td>
</tr>
<tr>
<td>90-94</td>
<td>92</td>
<td>1</td>
<td>92</td>
</tr>
<tr>
<td></td>
<td>Σf = 70</td>
<td></td>
<td>Σfx = 2972</td>
</tr>
</tbody>
</table>

Mean score was 2972/70 = 42.4

In the second test the respondents were subjected to a reading test. This consisted of two sections (i) Multiple choice (one hundred questions on the literally Kiswahili Braille codes) and (ii) assigned passage that was Brailed in with contracted Kiswahili Braille. The passage consisted approximately three and a half pages (25 lines per page, 28 cells lines.)

This test considered two major aspects of reading Braille. These aspects are: (i) recognition of contractions in Braille, (ii) speed of reading scored by reading comprehension whereby the respondents were requested to answer questions from the assigned Kiswahili passage.

In this test, a total of twenty eight (28) respondents were sampled randomly to do the test. This constituted 30.6% of the total number of the respondents of the study. Given that the respondents of this study were far apart in the country, the researcher realized that it would not be easy for him to gather all the respondents
together for the Braille reading test. The researcher had, however, an option to gathering all the respondents in each of the seven sampled schools but again the school authorities could not allow the interference of the school program. Due to this, the researcher sampled and requested the respondents to gather at one strategic place for them to do the test.

In the test, the comprehension passage was set in a way that it did not require the teachers to have much knowledge of Kiswahili. The reason for this was that not all teachers who teach in primary school have good mastery of this language. In addition the passage was timed in a way that the respondents who completed answering questions on time would be assumed to have read at a speed of one hundred twenty words (120) words per minute. The result of the respondents' performance in the test was as presented in the following table 4.12.

<table>
<thead>
<tr>
<th>Marks in % (x)</th>
<th>Frequency (f)</th>
<th>Xf</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>2</td>
<td>44</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>27</td>
</tr>
<tr>
<td>35</td>
<td>2</td>
<td>35</td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td>37</td>
</tr>
<tr>
<td>42</td>
<td>3</td>
<td>126</td>
</tr>
<tr>
<td>44</td>
<td>2</td>
<td>88</td>
</tr>
<tr>
<td>47</td>
<td>3</td>
<td>141</td>
</tr>
<tr>
<td>53</td>
<td>1</td>
<td>53</td>
</tr>
<tr>
<td>56</td>
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<td>56</td>
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<td>58</td>
<td>1</td>
<td>58</td>
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<tr>
<td>62</td>
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<tr>
<td>69</td>
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<tr>
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<tr>
<td>72</td>
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<tr>
<td>83</td>
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<td>83</td>
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<tr>
<td>88</td>
<td>2</td>
<td>176</td>
</tr>
<tr>
<td>93</td>
<td>1</td>
<td>93</td>
</tr>
</tbody>
</table>

\[ \sum f = 28 \]
\[ \sum fx = 1506 \]

**Mean = 53.8**

From the table, the mean grade was **54.9**
Considering the grade obtained by the respondents as shown in Table 4.12, and considering the fact that 100% was taken to represent a speed of 120 words per minute, the speed of reading was therefore as presented in the following table.

Table 4.13: Reading Braille at 120 Words Per Minute

<table>
<thead>
<tr>
<th>Marks in % (x)</th>
<th>Frequency (f)</th>
<th>WPM</th>
</tr>
</thead>
<tbody>
<tr>
<td>22</td>
<td>2</td>
<td>26</td>
</tr>
<tr>
<td>27</td>
<td>1</td>
<td>32</td>
</tr>
<tr>
<td>35</td>
<td>2</td>
<td>42</td>
</tr>
<tr>
<td>37</td>
<td>1</td>
<td>44</td>
</tr>
<tr>
<td>42</td>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>44</td>
<td>2</td>
<td>53</td>
</tr>
<tr>
<td>47</td>
<td>3</td>
<td>56</td>
</tr>
<tr>
<td>53</td>
<td>1</td>
<td>64</td>
</tr>
<tr>
<td>56</td>
<td>1</td>
<td>67</td>
</tr>
<tr>
<td>58</td>
<td>1</td>
<td>70</td>
</tr>
<tr>
<td>62</td>
<td>1</td>
<td>74</td>
</tr>
<tr>
<td>69</td>
<td>1</td>
<td>83</td>
</tr>
<tr>
<td>71</td>
<td>2</td>
<td>85</td>
</tr>
<tr>
<td>72</td>
<td>3</td>
<td>86</td>
</tr>
<tr>
<td>83</td>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>88</td>
<td>2</td>
<td>104</td>
</tr>
<tr>
<td>93</td>
<td>1</td>
<td>112</td>
</tr>
<tr>
<td>Σf = 28</td>
<td>Σfx = 1192</td>
<td></td>
</tr>
</tbody>
</table>

From table 4.13, the slowest respondent were two and they read at a speed of only twenty six (26) words per minute. Fourteen respondents read at a speed of less than sixty words per minute while only four respondents managed to read at a speed of 100 and or more words in a minute. The fastest respondent read at a speed of 112 words per minute.
From table 4.14, different categories of respondents read at different speeds. The fastest respondent was a female blind who read at a speed of one hundreds and twelve (112) words per minute. She was followed by two males' blind teachers who read at a speed of one hundred and four (104) words per minute. The second fastest female read at a speed of 100 words per minute. There was however one female sighted respondent who read at slow speed of 19 words per minute. The slowest male respondents were sighted who read at a speed of 22 words per minute.

### 4.4 Teachers’ Competence in Reading and Writing Braille Mathematics

Objective three of this study was to find out the competence of the teachers of learners who are visually impaired in primary schools in reading, writing mathematical notations and drawing mathematical shapes. Accordingly, the achievement test that was administered to the respondents had three parts. Part
one and two demanded that the respondents transcribe the given mathematical notations and expressions and in part three the respondents were expected to draw and label various mathematical shapes as directed in the test. In this effect, the result of test was analyzed as follows:

Table 4.15: Teachers’ Performance in De-Brailing Mathematics

<table>
<thead>
<tr>
<th>Class</th>
<th>Midpoint (x)</th>
<th>Frequency (f)</th>
<th>Xf</th>
</tr>
</thead>
<tbody>
<tr>
<td>30-34</td>
<td>33</td>
<td>6</td>
<td>198</td>
</tr>
<tr>
<td>35-39</td>
<td>37</td>
<td>5</td>
<td>185</td>
</tr>
<tr>
<td>40-44</td>
<td>42</td>
<td>8</td>
<td>336</td>
</tr>
<tr>
<td>45-49</td>
<td>48</td>
<td>7</td>
<td>336</td>
</tr>
<tr>
<td>50-54</td>
<td>51</td>
<td>12</td>
<td>612</td>
</tr>
<tr>
<td>55-59</td>
<td>56</td>
<td>9</td>
<td>504</td>
</tr>
<tr>
<td>60-64</td>
<td>63</td>
<td>2</td>
<td>126</td>
</tr>
<tr>
<td>65-69</td>
<td>67</td>
<td>6</td>
<td>402</td>
</tr>
<tr>
<td>70-74</td>
<td>74</td>
<td>4</td>
<td>296</td>
</tr>
<tr>
<td>75-79</td>
<td>77</td>
<td>4</td>
<td>308</td>
</tr>
<tr>
<td>80-84</td>
<td>82</td>
<td>2</td>
<td>164</td>
</tr>
<tr>
<td>85-89</td>
<td>87</td>
<td>2</td>
<td>174</td>
</tr>
<tr>
<td>90-94</td>
<td>93</td>
<td>1</td>
<td>93</td>
</tr>
</tbody>
</table>

Σf = 68   Σfx = 3,734

The mean therefore was 54.9.

From the table, 68 respondents sat for the test. The highest respondents scored 93% the respondent was closely followed by two others who scored between 85% and 89%. However, there were those who scored as low as 33%. Indeed three of them scored between 30% and 34%. The mean score for the test was 54.9%

It was not enough to test for de-brailing. This research did not assume that someone who knows to de-Braille is also able to Braille. Because of this, the respondents were subjected to the timed brailing test. The respondents’ performances were as presented in table 4.16.
### Table 4.16: Teachers’ Performance in Braille Mathematics

<table>
<thead>
<tr>
<th>Class</th>
<th>Midpoint (x)</th>
<th>Frequency (f)</th>
<th>Xf</th>
</tr>
</thead>
<tbody>
<tr>
<td>25-29</td>
<td>27</td>
<td>3</td>
<td>81</td>
</tr>
<tr>
<td>30-34</td>
<td>32</td>
<td>4</td>
<td>128</td>
</tr>
<tr>
<td>35-39</td>
<td>37</td>
<td>3</td>
<td>111</td>
</tr>
<tr>
<td>40-44</td>
<td>42</td>
<td>7</td>
<td>294</td>
</tr>
<tr>
<td>45-49</td>
<td>47</td>
<td>4</td>
<td>188</td>
</tr>
<tr>
<td>50-54</td>
<td>52</td>
<td>3</td>
<td>156</td>
</tr>
<tr>
<td>55-59</td>
<td>57</td>
<td>6</td>
<td>342</td>
</tr>
<tr>
<td>60-64</td>
<td>62</td>
<td>5</td>
<td>310</td>
</tr>
<tr>
<td>65-69</td>
<td>67</td>
<td>4</td>
<td>268</td>
</tr>
<tr>
<td>70-74</td>
<td>72</td>
<td>3</td>
<td>216</td>
</tr>
<tr>
<td>75-79</td>
<td>77</td>
<td>3</td>
<td>231</td>
</tr>
<tr>
<td>80-84</td>
<td>82</td>
<td>3</td>
<td>246</td>
</tr>
<tr>
<td>85-89</td>
<td>87</td>
<td>2</td>
<td>174</td>
</tr>
<tr>
<td>90-94</td>
<td>92</td>
<td>1</td>
<td>92</td>
</tr>
<tr>
<td>95-99</td>
<td>97</td>
<td>2</td>
<td>194</td>
</tr>
</tbody>
</table>

\[ \sum f = 53 \quad \sum fx = 3,031 \]

The mean is 57.2

From the table above, the respondents performed differently. The highest two respondents scored above 95% while the lowest three scored 27%. Out of 53 respondents, 21 scored below 50%.

#### 4.5 Teachers’ Competence in Guiding their Learners to Master Braille Text and Tactile Graphics

According to this objective, the first thing the researcher tested was the teacher’s skills in producing tactile graphics. This test assumed that if the teachers knew how to appropriately draw tactile graphics then it would be logical to say that the teachers would also be able to interpret the simple tactile graphics presented to the learners who are visually impaired in the primary school classroom. Accordingly, using Braille paper, spar wheel, drawing lubber, mart frame and stylus, (because these are the available resources in the special and integrated primary schools in Kenya), the respondents were requested to draw and label various shapes, diagrams and maps as was directed in the test (each learner was given five of each). The scoring of this test was based on the following facts about an
appropriate tactile graphics: (i) relevance to the concept being taught, (ii) has corpus direction, (iii) has a Key indicating various textures to represent various features, (iv) well labelled, (v) not overcrowded (vi) must be to the level of learners (vii) must be neatly drawn with tangible lines which would not cause strain to the visually impaired, (viii) the dotes must be firm enough that is not easily erased. (ix) Must be of appropriate size that is easy to read, (x) have the title. The performances of respondents in this test were as presented in Table 4.17 below.

### Table 4.17: Teacher's Competence in Drawing Tactile Graphics

<table>
<thead>
<tr>
<th>Class</th>
<th>Midpoint (x)</th>
<th>Frequency (f)</th>
<th>Xf</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-24</td>
<td>22</td>
<td>6</td>
<td>132</td>
</tr>
<tr>
<td>25-29</td>
<td>27</td>
<td>4</td>
<td>108</td>
</tr>
<tr>
<td>30-34</td>
<td>32</td>
<td>12</td>
<td>384</td>
</tr>
<tr>
<td>35-39</td>
<td>37</td>
<td>8</td>
<td>296</td>
</tr>
<tr>
<td>40-44</td>
<td>42</td>
<td>10</td>
<td>420</td>
</tr>
<tr>
<td>45-49</td>
<td>47</td>
<td>9</td>
<td>423</td>
</tr>
<tr>
<td>50-54</td>
<td>52</td>
<td>2</td>
<td>104</td>
</tr>
<tr>
<td>55-59</td>
<td>57</td>
<td>1</td>
<td>57</td>
</tr>
<tr>
<td>60-64</td>
<td>62</td>
<td>1</td>
<td>62</td>
</tr>
<tr>
<td></td>
<td>Σf = 53</td>
<td>Σfx = 1986</td>
<td></td>
</tr>
</tbody>
</table>

The mean score was 1986/53 = 37.4

From Table 4.17 only fifty three (53) respondents attempted the test with majority of them, twelve (12) scoring thirty to thirty four percent (30-34). Only four of the respondents managed to score above fifty (50%). The mean score of the test was thirty seven and four points (37.4). Teachers who scored 70 percent and above were considered to have attained Braille grade proficiency level.

To find out whether the teachers of the visually impaired pupils effectively guided their pupils to master Braille texts and graphics, the researcher first observed the
actual teaching in the classroom before allowing the respondents to answer questionnaires.

Therefore, with regard to this objective, a category and sign system was used for recording the guidance given to the learners to enhance their mastery of tactile graphics and Braille codes. According to Groenewegen (1985) in pure category system blocks of time are assumed, and each time certain behaviour occurs during that block of time the appropriate behaviour is ticked off in the row, column, or box provided for that period of time. In this instrument, the time block of five seconds was used. Only one entry was made for every period of five seconds. The tabulation of the codes reflected fairly accurately for what length of time certain behaviour was exhibited. The observer ticked off in the appropriate box as soon as certain behaviour occurred during a time block. The behaviour was coded only once during that period of time no matter for how long or how often it occurred. This category and sign featured two dimensions: (i) Braille text and tactile graphics (ii) stimulus function.

The Braille text and tactile graphics guidance were coded as follows:

Tgr: tactile graphics
Bcr: Braille codes recognition and reading
Bcw: Braille codes writing
Btf/l: Braille text format and layout

These codes were entered at an interval of five seconds in the four columns which each represented one stimulus function:

S: for teaching skills and procedures,
B: for supporting brainstorming,  
C: for teaching content, and  
T: for task giving.

The classroom observation guide was used to observe teaching sessions of Kiswahili, English and Mathematics in both special schools and integrated schools for the blind. Two schools which were in different categories; one in the category of special school and one in the category of regular school with integrated program for the learners who are blind were selected for observation in class sessions.

The observer sat at the back of the class. Then he took out the observation sheet. The researcher stopped recording immediately the teacher stopped teaching. The teacher’s attempts to guide the learners in Braille codes and tactile graphics were done as per the stimulus function in the teaching in the two categories of schools and were as presented in Table 4.18 in the next page.
Table 4.18: Observed Data of Teachers Guiding the Learners on Mastery of Tactile Graphics and Braille Characters; Observed Per Stimulus Functions

<table>
<thead>
<tr>
<th>Matched in %</th>
<th>Skills &amp; procedure</th>
<th>Brain-storming</th>
<th>Content teaching</th>
<th>Task giving</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Special School</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>Tactile graphics</td>
<td>38</td>
<td>23</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Characters reading</td>
<td>58</td>
<td>42</td>
<td>46</td>
</tr>
<tr>
<td></td>
<td>Characters writing</td>
<td>13</td>
<td>-</td>
<td>26</td>
</tr>
<tr>
<td></td>
<td>Braille layout</td>
<td>26</td>
<td>17</td>
<td>7</td>
</tr>
<tr>
<td>English</td>
<td>Tactile graphics</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Characters reading</td>
<td>10</td>
<td>21</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Characters writing</td>
<td>23</td>
<td>8</td>
<td>68</td>
</tr>
<tr>
<td></td>
<td>Braille layout</td>
<td>-</td>
<td>-</td>
<td>5</td>
</tr>
<tr>
<td>Kiswahili</td>
<td>Tactile graphics</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Characters reading</td>
<td>-</td>
<td>7</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td>Characters writing</td>
<td>-</td>
<td>23</td>
<td>58</td>
</tr>
<tr>
<td></td>
<td>Braille layout</td>
<td>16</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Integrated programmes</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mathematics</td>
<td>Tactile graphics</td>
<td>27</td>
<td>22</td>
<td>25</td>
</tr>
<tr>
<td></td>
<td>Characters reading</td>
<td>38</td>
<td>-</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Characters writing</td>
<td>-</td>
<td>5</td>
<td>29</td>
</tr>
<tr>
<td></td>
<td>Braille layout</td>
<td>32</td>
<td>24</td>
<td>47</td>
</tr>
<tr>
<td>English</td>
<td>Tactile graphics</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Characters reading</td>
<td>-</td>
<td>34</td>
<td>33</td>
</tr>
<tr>
<td></td>
<td>Characters writing</td>
<td>42</td>
<td>29</td>
<td>27</td>
</tr>
<tr>
<td></td>
<td>Braille layout</td>
<td>-</td>
<td>-</td>
<td>12</td>
</tr>
<tr>
<td>Kiswahili</td>
<td>Tactile graphics</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Characters reading</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Characters writing</td>
<td>24</td>
<td>13</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Braille layout</td>
<td>17</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

From Table 4.18 in the previous page, it is evident that the teachers of learners who were visually impaired did not use tactile graphics in their teaching of Kiswahili and English. The teachers were supposed to correct Braille errors from learners within five seconds. They also did not use the tactile graphics in teaching of Mathematics. The figures in the table indicates that teachers in both integrated programmes and special schools used less than 50% of their teaching time to guide their learners to master tactile graphics. In addition, the teachers guided their learners on Braille layout which included text paragraphing, mathematical figures arrangement and sentence construction.
During the Focus Group Discussions, the researcher wanted to know why teachers did not use tactile graphics and rarely guided their learners in the mastery of Braille characters which included contractions. The teachers complained of lack of time and knowledge to make and use the tactile graphics. They further stated that they were not taught how to make and use the tactile graphics. Some of the teachers, (35%) of those who attended the group discussion insisted that there was no need for Braille layout because a person who is blind will never see the beauty of the layout. They added that Braille grade 2 should be taught to learners before they are enrolled in standard one class otherwise it was a waste of time to teach them concurrently with other subjects.

4.6 Views of the focus group on Braille

In a descriptive survey research such as this one, the views of a focus group provide findings which are quite vital as they reveal important respondents' feelings and suggestions which may not be covered by the other research instruments (Mugenda and mugenda, 1999). The process was first carried out during pilot study in which the researcher purposively selected twelve teachers who had been teaching English, Kiswahili and mathematics in the school for more than two years. This period was regarded to be reasonable for teachers who might not have gone through special needs education to have mastered some especial skills, for instance, Braille proficiency, for effective interaction with there learners. This gave the researcher a better picture of the class room interaction as the teachers endeavoured to impart Braille skills to the learners in the teaching and learning process.
Further, the researcher sampled the teachers teaching in upper primary classes because grade 2 Braille is essential for examination preparation to learners as well as to teachers teaching such classes. The teachers were expected to have adequate Braille literacy. This knowledge also enabled them to actively participate in the focus group discussion. The same procedure was later followed in the actual research in the special schools and integrated programmes under study. However, the researcher used all the schools in integrated programmes because they were relatively less than those found in special schools.

One session of focus group discussion was conducted in each school and in each integrated programme under study. In total, eight discussion sessions were all together conducted. In each discussion sessions the discussion was based on the seven areas provided in the guide (refer to appendix c). The views provided here were those that were reflected in all the eight discussion sessions including that of the pilot study.

The first question sought to know the respondents' views about the shortcomings of using Braille as a medium of communication. In respondents, majority in each case felt that Braille was entirely for such readers. 'After all, 'they argued, 'Braille himself was blind, therefore, he developed the code for persons who were like him.' 25% added that it was too difficult to read by sight 'it looks very unpleasant and hard to decipher', they said. Still, some complained that Braille, unlike print, encouraged some rote learning of its rules arrangements of dots and constant practice in order to gain proficiency and literacy. Some of the respondents even claimed that they feared reading Braille lest they became blind through reading it
with fingers. Similarly, those respondents who were blind, complained of Braille books being bulky, slow to read and difficult to store. They agreed it better do with talking books, tape recorders and computers with jaws.

To overcome some of the above difficulties associated with Braille, many of the respondents, including those who were blind, generally felt that Braille embossers, despite the high cost of brailing a single Braille volume, would solve the problem. 'Alternatively,' we might as well use live readers to read print for us. However, majority of the respondents stated that computer technology had not come to replace Braille but rather to enhance it and to expand its opportunity so as to reach more users. 'Remember,' they stressed Braille represents information and education for people who are blind including learners with blindness in schools.

As far as the place of Braille in an inclusive setting was concerned, respondents expressed their fears that various views of which most common included: 'Braille proficiency and literacy might suffer terribly through out the country due to inadequate teaching staff who knew it as well as tactile graphics'; 'they will use computers in writing their tests and examination'; and others strongly believed that all stake holders of inclusive education particularly teachers, would train in special need education in order to specialise such as Braille and sign language. However, many respondents also expressed the view that if Braille still remained in the inclusive settings of the western countries, it would never disappear in Kenyan school as an instructional medium and communicational skills for learners with blindness. There is no reading and writing compensation for them,' some argued 'because it is an-experiential and enjoyable activity.'
Respondent’s views on teacher’s competence in the use of Braille as a medium of instruction for learners with blindness were unanimously taken to be of paramount importance in each school under study. Each respondent expressed his/her concern that it was necessary that sighted teachers, as well as those who were blind took pride in acquiring Braille proficiency and literacy, irrespective of the various superstitions and negative attitudes levelled against the system. ‘How do we expect our pupils to learn effectively from what we do not approve as teachers, or are prejudiced against as individuals?’ many of the respondents wondered. In the mood of co-operation and professional assistance, some teachers who were blind offered themselves to help their sighted colleagues to learn Braille and tactile graphics if asked to.

Although all respondents generally agreed that primary level really enabled each learner to acquire basic skills such as Braille literacy from qualified professionals, they also complained of understaffing, heavy teaching load and low pay. ‘We teach special needs education in special schools and all integrated programmes and in a difficult environment and therefore, we need motivation,’ they said. ‘We also need to be given study leave to refresh our teaching skills including Braille proficiency and tactile graphics.’

In order to improve Braille proficiency and literacy among the teaching staff and learners in each primary school for the blind and all integrated programme, respondents raised the following suggestions:

- All teachers posted to teach either in a special school or in an integrated programme should be certified as Braille proficient
• Braille should be taught as a subject in every class in primary level

• All important places and items in every special school and integrated programme should be labelled in Braille.

• Every special school and integrated programme must have well revamped libraries with Braille literature

• All teachers should not only encourage learners to grow into the habit of reading Braille books and to having positive attitude towards Braille, but also be Braille literate themselves

• Teachers should encourage learners in each special school and in each integrated programme to learn Braille as a communication skill because it is inter-disciplinary.

• Each special school and each integrated programme should establish a culture of holding Braille competitions, as well as rewarding teachers of the winning pupil.

• Every special school and every programme should participate in all social events in which Braille is demonstrated, for instance local and national shows.

• Teachers to encourage giving all assignments in Braille grade 2.

• All special schools and integrated programmes should encourage the culture of reading Braille books and other related literature, for instance biblical passages, poems and essays before audience.

• As teaching is also a learning process, all specially trained teachers should develop the interest of teaching Braille, reading and writing it as practice makes perfect.
By interpretation, respondents regarded the term, 'community' to include the neighbours of each special school and each integrated programme: such as pupils parents, pupils pen pals (who may well be their sponsors), school sponsors: donors, well wishes, board of governors, suppliers of goods, consumer organisations such as Kenya Institute for the Blind, Kenya Society for The Blind, Sight Savers International, Kenya Union for the Blind, Kenya Institute for Special Education, National Council for Persons with Disability, the churches, Companies and Banks among others.

Teachers felt that these people and groups in the field of blindness had a role to perform in improving Braille literacy instruction. They could significantly assist special schools as well as integrated programmes in terms of finance, donations, facilities, fees, books, computers, Braille's, infrastructure, and fund rising. Further, teachers took it to be their challenge to make additional contribution to ensure provision of Braille quality instruction, such as making presentations at national or international conferences or parent meetings on teaching Braille experiences; volunteering to teach reading and writing Braille to interested adults in their community.

Finally, respondents in each special school and each integrated programme under study expressed their view that the government of Kenya should consider increasing their remunerations and financial assistance to the school development and to assist individual learners. We need to be given opportunities for self development by attending fresher courses in special needs Education' they said. 'We are always determined to do our best,' they promised.
4.7 Conclusion

In concluding this chapter, it is imperative to mention that the ability to manage and to manipulate the information is vital to everyone’s success, dignity and perceived self worth as an individual that Braille represents information and education for learners who are blind; that whatever education system there might be, it is necessary to ensure that learners who are blind can easily gain access to the information they need; and that Braille literacy relates specifically to the learning potential of learners who are blind and whose individual needs may require instruction in various media for reading and writing from teachers who are quite resourceful and Braille proficient.

However, from the data presented and analyzed, in this chapter, it is evident that the teachers who ought to help the learners who are visually impaired to master Braille were not well prepared to curry out this noble work. This can only be clear when consideration of discussion and summary of each variable of this study is done. That matter is discussed in the following chapter was designed for this purpose.
CHAPTER FIVE

ANALYSIS, SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.0 Introduction

The objective of this chapter is to present the discussion and summary of the findings of the study based on the objectives of the study, the recommendations, and suggestions for further studies.

5.1 Summary of Findings

The summary of the findings was based on objectives of the study.

5.1.1 Teachers' Competence in Reading and Writing English Braille

Teacher’s competence in reading and writing Braille is paramount in the learning of the pupils who are blind. Competence in English Braille especially is essential for the teachers of the learners who are blind in the Kenyan schools because English is the language of instruction. This study had therefore to investigate the competence in writing and reading English Braille, mathematics Braille and Kiswahili Braille as core subjects in primary level.

5.1.2 Teachers' Competence in Writing English Braille

According to objective one of this study, the researcher was to determine teachers’ ability to guide their learners in mastery of English Braille. In this sense, the teachers were subjected to achievement tests to measure the extent to which the teachers read and wrote English Braille grade 2. The teachers were first subjected to a brailing test. It was imperative to find out whether the respondents could write
Braille. According to Rex, et al (1995) those who are able to write Braille should be able to reasonably guide others to do the same.

From Table 4.4 seventy two (72) respondents managed to do the test. Out of the sample of eighty nine respondents, seventeen (17) of them did not do the test. The reason they gave for this was that they were still learning Braille. This reason precisely showed that some of the teachers under study could not communicate effectively with their learners due to their lack of Braille knowledge. In addition to this, out of seventy two (72) respondents who did the test, forty nine (49) of them (sixty eight percent 68%) of them scored less than fifty percent (50%) in the test. The implication was that majority of the teachers could not appropriately guide their learners to use Braille.

In the sense that the research sampled those teachers who had taught the learners who were blind for more than two years (Table 4.3) and that some of the teachers among them (24) were able to score more than sixty five percent (65%), (Table 4.4), it would appear that the teachers lacked interest to learn Braille. However, during the focus group discussion, the respondents argued strongly that the school workload was overwhelming and that they did not get sufficient time to learn Braille.(see 4.6). Those who were competent in writing Braille (scored over seventy Percent 70%) were few and they were willing to volunteer to train or and in-service those who did not have enough Braille knowledge. The teachers at that point unanimously concluded that a major college should be established for training Braille since the teacher’s colleges in Kenya and especially Primary
Teacher's Training Colleges did not expose their students to Braille, an idea which appears to be practically impossible.

It was also observed that apart from those who had degrees in special needs education, those who had diplomas from the Kenya Institute of Special Education (KISE), and of course those who were blind, the rest of the teachers were not specially trained to teach the learners who were blind yet they were posted in special schools and integrated programmes to teach learners who were blind. Some served as itinerant teachers and advisers to other teachers teaching in integrated schools for the blind. In addition, it was assumed that the teachers who were blind did not require special training to assist their learners to master Braille. This may not be true in the sense that learners who are blind differ significantly from the sighted when it comes to the understanding of new knowledge, skills and experiences. Groenewegen (2005) asserts that in the scenario where the teachers of learners who are blind are not specially trained to teach learners who are blind, the teaching and learning situation becomes very difficult; neither are the teachers nor the learners able to explain their plight in this situation.

5.1.3 Teacher's Competence in Reading English Braille

According to this objective, the respondents were also subjected to a Braille reading speed test. In the test, two aspects of reading Braille passage were considered

- Recognition of Braille characters and contraction.
- Comprehension of the text.
The speed at which the respondents read Braille would determine the extent to which a respondent is able to recognise Braille contractions and consequently the mastery of English Braille. The speed of reading is not only determined by how many words one can read per a given period of time but by reading with understanding; study test (Spungin, S. J. 1996). In this sense, the respondents were expected to answer questions from the reading Braille text. The findings in Table 4.7 indicate that out of the twenty eight (28) respondents, who did the test, two females who were blind and two male teachers who were blind managed to read more than one hundred words per minute. This is a good speed in that the speed of reception through Braille for adult is 90-120 words per minute (Groenewegen 2005). Further, the findings clearly showed that seven respondents managed to read more than ninety (90) words per minute. As explained earlier in this thesis, a reading speed of 90-120 words per minute denoted competency in Braille reading (Weaver, 1994). In this sense, only seven out of the twenty eight (28) selected respondents could be said to be competent in reading English Braille Grade II. This is not good enough because the personal and professional lives of people who are blind highly depend on the value they give to Braille (Hatlen & Spungin, 2008). It appears that Kenya is not in any way a unique case in regard to Braille incompetence among teachers.

Research conducted in the United Kingdom has found that the proportion of Braille readers among people who are blind is remarkably low (Edman, 1992). Further, studies conducted in the United States have revealed that Braille literacy rates have gradually declined over the past five decades (American Printing House for the Blind, 1996). However, Braille proficiency and literacy should be taken
seriously especially in developing countries where assistive technology for the blind is rare. According to Gerber, (2003), assistive technology has been blamed for contributing to the general decline in value of Braille.

5.1.4 Comparison of Speed of Reading Braille in Terms of Gender and Visual Status

It was not the initial intention of the researcher to investigate the speed of reading Braille in terms of gender or and visual status of the teachers. However, the sentiments by Mondoh (2001) that females learners perform better compared to males as regards speed test of reading triggered the researchers' interest to make a simple comparison between the speed of Braille reading by the male teachers and that of the female teachers. The finding of this study, nevertheless, did not indicate any difference between the speeds of reading Braille by the male teachers compared to that of the female teachers. According to the findings as presented in Table 4.9, out of the total number of twenty eight (28) respondents who did the test, four female teachers managed to read at a high speed of 90 words per minute and above and only three males out of the fourteen (14) males who did the test managed this speed.

Comparing the speed of reading English Braille by the sighted teachers and teachers who are blind, the findings of this research indicated a significant difference. For example, considering the two sighted teachers who managed to read at a speed of more than ninety (90) words per minute and who could be said to be competent in reading English Braille with that of the five teachers who were blind, it would be obviously easy to tell the difference. According to Table 4.14 the fastest sighted reader was a female who read at a speed of ninety (90) words
per minute. She was followed by the fastest male teacher who was sighted to read at a speed of only 60-69 words per minute. The researcher was interested in finding out how the female sighted teacher achieved the high speed of reading Braille. On interviewing, the researcher found out that the teacher had been teaching Braille to learners with blindness for more than eighteen (18) years and therefore she was familiar to the Braille reading and writing. The conclusion likely to be made here is that more the teachers use Braille to read and even teach it to the learners the more the teachers become competent in Braille. It may also be noted that sighted teachers mostly rely on the visual media compared to Braille when gathering information or acquiring new dispositions from the environment (Groenewegen, 2005). In this sense, the sighted teachers spend very little time on Braille reading compared to the teachers who are blind and who have no option but to use Braille.

5.2 The Teacher’s Competence in Reading and Writing Kiswahili Braille Grade 2

As discussed earlier, Braille is a medium of communication for persons who are blind. It was developed by a French man Louis Braille (1809-1852) in France. As such, Braille was first written in French and later on adopted for use in other languages in the world such as Kiswahili after its introduction at East Africa in the 20th century. (See 1.1) Hence, Kiswahili is used in Kenya as a National Language and it is examinable in schools. Furthermore, the language uses different Braille contractions from those in English Braille. Due to this, it was necessary for the researcher investigate the extent to which the teachers with blindness were prepared to teach and to guide their learners to master Kiswahili Braille grade two.
Consequently, the respondents of this study were subjected to Kiswahili achievement test and interview in order to determine their competence in Kiswahili Braille. The teachers were requested to transcribe Kiswahili Braille before they were subjected to an English Braille reading speed test. The findings of the study indicated that in writing Kiswahili Braille, only seventy (70) out of the sample of eighty nine (89) respondents did the test. The remaining nineteen (19) respondents clearly stated that they did not at all know Kiswahili Braille. Out of the seventy (70) who did the test, majority of them scored less than 40% while only four of them managed to score more than seventy percent (70%) in the test. The mean score for the test was as low as 39.

In the test involving transcribing Braille to print, From Table 4.11, seventy (70) respondents sat for the Braille transcribing test. Majority of them scored between thirty five percent and thirty nine percent. Only four respondents managed to score seventy percent (70%) and above in the test. As highlighted earlier in chapter 4.5, those who scored 70 and above per-cent in the test could be classified as competent teachers in Braille. The mean score was forty two point four points (42.4). Just as it was the case of brailing, nineteen (19) respondents did not do the test for the same reason that they did not have adequate knowledge of Kiswahili Braille. The performance in this test was not very different from that of brailing due to the fact that the respondents scored low marks.

Judging by the performance of the two tests, it was clear that majority of teachers of learners who were blind was adequately prepared to assist their learners in the mastery of Kiswahili Braille. The slight deference that was observable in the
performance of brailing in comparison with Braille transcription to print was that the mean score of transcription was relatively higher. This was understandable given that a combination of Braille dots represented a visual image that would easily remind the reader what the combination of the dots represented and hence enhanced the transcription of Braille by the reader. In this sense, it was quite easy for the respondents to recognize and to remember the Braille contractions as opposed to the situation in which they were supposed to remember the contraction and to write them down.

The speed of reading Kiswahili Braille was an important factor to consider in this study. It was assumed that the faster the respondent was able to read Braille the more competent the respondent was in Braille. The reason for this assumption was that if one was able to read fast, he or she was able to recognise Braille characters and contraction easily and therefore the respondent’s mastery level of Braille was desirable. According to the findings of the study, (Table 4.7), out of the twenty eight (28) respondents who were subjected to the test, the slowest respondent were two and they read at a speed of only twenty six (26) words per minute. Fourteen respondents read at a speed of less than sixty words per minute while only four respondents managed to read at a speed of 100 and above words in a minute. The fastest respondent read at a speed of 112 words per minute. The expected speed in this test was 120 words per minute, a simple calculation showed that only twelve (12) respondents out of the twenty eight (28) managed half of the required speed (a speed of more than seventy words per minute).
From the findings based on gender (Table 4.14) the fastest respondent was a female blind who read at a speed of one hundred and twelve (112) words per minute. She was followed by two other male teachers who were blind and read at a speed of one hundred and four (104) words per minute. The second fastest female read at a speed of 100 words per minute. There was however, one sighted female respondent who read at slow speed of 19 words per minute. There were two slowest sighted male respondents who read at a slow speed of 22 words per minute. What was strikingly clear from the findings is that respondents who are sighted both male and female read at a slower speed compared to the respondents who were blind. There was only one female sighted respondent who read at a faster speed of 95 words per minute. Two sighted female and one sighted male also managed to read at a speed of 60-69 words per minute while the rest of the sighted respondents read at a slower speed. This situation could be understood in that mostly the teachers who were sighted used more of the print and visual resources to gather information and hence depended less or not at all on Braille. By doing so, they lacked enough practice in Braille and therefore they would be expected to read at a slower speed compared to the teachers who depended wholly on Braille to gather information.

5.3 Teachers’ Competence in Reading and Writing Braille Mathematics

The combination of Braille dots that are used to write numbers and those that compose mathematical signs are apparently different from the combinations that make letters of the alphabet and make contraction in Braille text (Kapperman, Wiever & Sticken, 2000). (see 2.5.6.) Due to this, it is not obvious that a person who learns English or any other language Braille is also knowledgeable in
mathematics Braille. It was therefore necessary to determine competence in mathematics Braille of the teachers of learners who are blind. The achievement test which was subjected to the respondents had three parts. Part one and two required the respondents to transcribe the given mathematical expressions into mathematical Braille notations and in part three the respondents were asked to draw and label various mathematical shapes as directed in the test.

The result of the test in table 4.10 clearly indicates that in brailing section of the test, 68 respondents sat for the test. The highest respondent scored 93%. The respondent was closely followed by two others who scored 89 and 85 percent respectively. However, there were those who scored as low as 33%. Indeed, three of them scored between 30% and 34%. The mean score for the test was 54.9%.

For transcribing Braille test to print, in table 4.16 the results of the test indicate that the respondents performed differently. The highest two respondents scored above 95% while the lowest scored 27%. Out of 53 respondents, 21 scored below 50%. The mean score was 57.2%.

It was quite interesting to observe that unlike the result of the languages discussed earlier, the teachers performed better in the brailing test than transcribing test. After the teachers were asked what they found more difficult between brailing and transcribing, the teachers unanimously agreed that neither was more difficult compared to the other so long as a person had enough knowledge of mathematics Braille.
After encountering this unfamiliar situation, the researcher decided to make a closer examination on the scripts of the test once again. It was discovered that majority of the respondents made errors while transcribing Braille to print by confusing mathematical signs with those of the Braille text contractions. The commonest mistakes that were found among others were those of confusing the number sign (dots 3, 4, 5, 6) with the group sign that represented (–ble) which shared the same Braille dots. Others were dots 2, 3, 5, 6 commonly known as lower G that represent curved brackets in Braille prose with dots 1, 2 and 6 and dot 3, 4 and 5 that represented the curved opening bracket and closed bracket respectively in mathematics Braille. (see 4.6) The conclusion was therefore drawn that the respondents lacked enough practice in mathematics Braille which would otherwise have minimized errors.

5.4 Teachers' Competence in Guiding their Learners to Master Braille Text and Tactile Graphics

As a matter of fact teachers of learners with visual problems should use more learning aids including graphics and relevant reading passages to enhance understanding of spatial concepts by their learners, (Mugo, 2007). Most of concepts taught to the learners for example in mathematics, geography and sciences often deal with shapes, directions and other measurements that demand the knowledge and experience of the spatial concept. Further, it may be pointed here that teachers should be able to improvise the learning aids rather than depend on the expensive and rare imported learning aids for the blind learners. In this sense, this research found it essential to investigate the extent to which teachers of the blind managed to draw tactile graphics that would aid in teaching/learning
mathematics. This was because this skill was regarded to be part of Braille proficiency and literacy.

Thus, the researcher tested the teacher’s skills in producing tactile graphics. This test assumed that if the teachers knew how to appropriately draw the tactile graphics then it would be logical to assume that the teachers would also be able to interpret the simple tactile graphics presented to learners who are blind in the primary school classroom. Using Braille paper, spar wheel, drawing lubber, mart frame and stylus, (because these are the available resources in the special and integrated primary schools in Kenya), the respondents were asked to draw and label various shapes, diagrams and maps as was directed in the test. The scoring of this test was based on the following facts about an appropriate tactile graphic: (i) relevance to the concept being taught, (ii) has corpus direction, (iii) has a key indicating various textures to represent various features, (iv) well labelled, (v) not overcrowded, (vi) must be to the level of learners, (vii) must be neatly drawn with tangible lines which would not cause strain to the learners as they touched, (viii) the dots to be firm and not easily erased. (ix) must be of appropriate size that is easy to read through touch and (x) have a title.

The performance of respondents in this test indicated that only fifty (53) respondents attempted the test with majority of them, twelve (12) scoring thirty to thirty four percent (30%-34%). Only four of the respondents managed to score above fifty percent (50%). The mean score of the test was thirty seven point four points (37.4). The rest of the respondents (36) did not attempt the test. When
asked they reported that they did not have any knowledge or skill in drawing of the tactile graphics.

Mugo (2007) in his study on methods of teaching pupils who are blind found out that some teachers had knowledge of using the appropriate teaching/learning aids but the teachers did not use them in the teaching/learning situations. In order to find out whether the teachers of learners who were blind effectively guided their pupils to master Braille texts and graphics, (which is part of competency in Braille), the researcher, through his core researcher made observations in classroom sessions. The observation as presented in Table 4.18, give evidence that the teachers did not use tactile graphics in their teaching of Kiswahili and English. They seldom used the tactile graphics in teaching of Mathematics too. The figures in the table indicate that the teachers in both the integrated and the special schools used less than 50% of their teaching time to guide their learners to master tactile graphics. In addition, the teachers did not effectively guide their learners on Braille layout which included text paragraphing, mathematical figures arrangement and sentence construction.

During the focus group discussion, the teachers complained of lack of enough time and enough knowledge to make and use the tactile graphics. They further complained that they were not taught how to make and use tactile graphics. Some of the teachers, (35%) of those who attended the group discussion insisted that there was no need for Braille layout because the learners did not see and internalise the beauty of the layout. They also added that Braille grade 2 should be taught to learners before they are enrolled in standard one otherwise it was a
waste of time to teach them Braille as the teachers taught their various subjects. (See 4.6)

The respondents could be right to claim that they lacked knowledge of creating tactile graphics. The test administered to them clearly gave clear evidence that they were not skilled to create the tactile graphics. Moreover, the teachers who had been trained in special education stressed that they were taught only text Braille and not tactile graphics. Furthermore, in Kenya very few researches have been done in the area of instructions for learners who are blind. The teachers' claim that children should be taught Braille grade 2 before they are enrolled in standard one, shows that the teachers lacked knowledge of Braille proficiency and literacy. The use of Braille skill is a continuous process which is best done in the teaching and learning process as learners learn other contents presented to them by their teachers. Showbaker (1992) stresses that Braille skill as well as tactile graphics is best mastered as learners use them in their daily lives both at home and school.

Lack of Braille proficiency of teachers may not be limited only to Kenya. Various countries in the world have for a long time lacked enough competent teachers of learners who are blind. For example according to Gale, (2004), the extreme lack of appropriately qualified teachers in visual impairment is a matter of major concern for Australian educators. Economic rationalist policies have caused the closure of many tertiary courses and several States and Territories, for some years, have had no formal specialist teacher training programs.
In concluding this chapter, it is vital to emphasise that there is a dire need to enhance training of Braille to the teachers of learners who are blind so that they can competently guide their learners in mastery of Braille. It is evident that the teachers who are teaching learners who were blind in the Kenyan primary schools and integrated programmes lack enough knowledge of Braille. The importance of mastery of Braille by both the learners with blindness cannot be underestimated. As a compensatory academic skill, Braille is the student’s major literacy medium and as such it must be taught effectively (Hatlen, 1997). Such teachers must be trained and fully competent Braille users. They must have a comprehensive understanding of, and total commitment to the Braille code and tactile graphics.

5.1 Summary of the Findings

5.5.1 Teachers Competence in English Braille Grade 2

The findings of the study clearly showed that majority of teachers of learners who were blind had not mastered English Braille grade 2 to effectively interact with their learners in the teaching and learning processes. This was evidenced by low performance in the achievement tests presented to the teachers in this research. Furthermore, during the focus group discussion with the teachers, the teachers complained of lack of enough time to practice reading and writing Braille. Some of the sighted teachers of learners who were blind explained that they were not taught Braille in the colleges in which they were. They trained as teachers and therefore they had been learning Braille from their colleagues who are blind as they continue teaching learners who were blind. Through the classroom observation, it was found out that the teachers rarely guided their learners in mastery of English Braille.
5.5.2 Teacher competence in Kiswahili Braille Grade 2

As was in the case of English Braille Grade 2, the achievement test in Kiswahili was poorly performed. In addition, the teachers unanimously agreed that majority of them did not have enough knowledge of Kiswahili Braille during the Focus Group Discussion. Indeed out of the eighty nine (89) respondents selected for this study, seventy (70) of them attempted the test. The rest (19) refused to do the test explaining that they did not know anything in Kiswahili Braille. It was clearly found out that during the classroom observation, teachers of the blind rarely assisted their learners when they got stuck as they read and wrote Kiswahili Braille. In essence, majority of the teachers of learners who were blind were found not competent in Kiswahili Braille and therefore could not interact effectively with their learners in class.

5.5.3 Teachers Competency in Braille Mathematics Notation

The achievement test in Mathematics required teachers of learners who were blind to Braille mathematical expressions as well as to write down numbers and signs. The teachers were also required to transcribe a given brailed mathematics. Out of the eighty nine (89) sampled respondents fifty three (53) attempted the test. Thirty six (36) respondents were unable to do the test. On inquiry why they did not attempt the test they explained that they did not know Braille mathematics. Those who attempted the test, some of them confused mathematics signs with those of English Braille punctuations. It was however noted that unlike in performance in the already discussed languages more than fifty percent (50%) of the teachers who did the achievement test scored more than fifty percent in the test. During the classroom observation, the teachers who taught Mathematics were
found relatively active in guiding the learners in mastery of the Braille mathematics codes. Unfortunately, it was observed that the teachers used less learning aids for example tactile shapes, tables, figures arrangement in arithmetic and so on to facilitate learning mathematics for their learners who were blind.

5.5.4 Teachers Competency in Guiding Learners to Understand Tactile Learning Aids

According to this objective, the teachers were subjected to achievement test which assessed their abilities to create and to utilize tactile learning aids in their teaching. First, the teachers were tested on the creation of the learning aids and later on the researcher observed in the class sessions to find out how well the teachers guided their learners to understand the various contents they taught using the tactile graphics. The respondents were requested to draw and to label various shapes, diagrams and maps as was directed in the test. Only fifty three (53) out of the eighty nine sampled respondents attempted the test. The rest had no knowledge of the drawing and labelling skills. The fifty three respondents did the test but only four managed to score 50% and above with the leading respondent managing 62%. The test was not well performed.

The researcher further wanted to find out whether the teachers effectively guided their learners in mastery of Braille. Using the observation guide, the researcher’s co-researcher observed class teaching sessions. The researcher assistant observed the extent to which the teachers guided their learners in the following areas: understanding tactile graphics; recognition of Braille characters; writing Braille character and drawing tactile graphics.
The findings showed that the teachers did not use tactile graphics in their teaching of Kiswahili and English. They also did not use the tactile graphics in the teaching of Mathematics. The teachers in both the integrated programmes and the special schools used less than 50% of their teaching time to guide their learners to master tactile graphics. In addition, the teachers did not guide their learners on Braille layout which included text paragraphing, mathematical figures arrangement and sentence construction. This clearly indicated lack of competency on the part of the teacher in guiding learners to master Braille.

5.6 Conclusion of the Study

The question that this study endeavoured to answer was whether teachers of learners who were blind were competent Braille readers and writers for easy interaction with their learners and for effectively guiding them to master Braille. Consequently, the study investigated the teacher’s abilities to read and write English and Kiswahili Braille grade 2, Braille mathematics notations and to create tactile graphics which aid teaching and learning of learners who are blind. The study further established the extent to which the teachers guided their learners to master Braille code and understand the tactile graphics.

The findings of the study evidently showed that the teachers lacked Braille proficiency. The teachers scored poorly not only in the achievement test subjected to them but also demonstrated lack of competency in guiding their learners to use Braille effectively in learning situations.
The related literature reviewed in this study indicated that lack of Braille proficiency and literacy of the teachers of learners who are blind in Kenya was not the only case in the world. The problem affects many other countries. For example, according to Gale, (2004), the extreme lack of appropriately qualified teachers of learners who are blind is a matter of major concern for Australian educators. The same situation had been sighted in United Kingdom where research found out that the proportion of Braille readers among people with blindness was remarkably low. Studies conducted in the United States revealed that literacy rates in Braille had gradually declined over the past five decades (American Printing House for the Blind, 1996.)

This situation is unfortunate for the learners with blindness. As a compensatory academic skill, Braille is the student’s major literacy medium and as such it must be taught effectively by the teachers (Hatlen, 1997). Such teachers must be trained to become fully competent Braille users. They must have a comprehensive understanding and total commitment to the Braille code and tactile graphics. This is because the personal and professional lives of people with blindness highly depend on the value they give to Braille (Hatlen & Spungin, 2008).

5.7 Recommendations of the Study

The following recommendations were made based on the findings of the study.

1. The study findings revealed that most of the teachers for learners with blindness lacked Braille competency. The majority of them had forgotten many of the Braille characters and contractions. It is therefore the recommendation that these teachers be regularly given refresher courses to
improve their Braille skills and for those who had not been trained and are willing to train in Braille literacy, they be given the opportunity to do so. This applies to teachers who are blind, those who are low vision as well as those that are sighted. This can well be done through the support of the Ministry of Education and organisations of the blind both nationally and internationally.

2. It was found that the teachers for learners who were blind were not specifically trained in Braille in the colleges where they trained as teachers. It is recommended that the Ministry of Education, through Kenya institute of education includes Braille in the curriculum of the primary teachers training colleges.

3. The teacher for learners who are blind, including those that went through special education, reported that they were not trained in the creation and use of tactile graphics for teaching learners with blindness. It is therefore the recommendation of this study that the departments of Special Needs Education in universities, as well as teacher training colleges, train the teachers on the skill of producing the tactile graphics and in addition train them on how to use the graphics to teach the learners who are blind.

4. The study established that the distribution of teachers who were specially trained in Braille was not equitable among the special and the integrated programmes in the country. Most of the teachers who had some knowledge in Braille were concentrated in the special schools for the blind. In this case the few teachers in the integrated programmes who had knowledge in Braille could not match the demand of the teachers who wished to learn Braille. This study would therefore recommend fairer distribution of these teachers by the
teacher's service commission. This would apparently help the cases of lack of Braille skills by the teachers who teach learners who are blind in the integrated programmes.

5. The study found out that most of the sighted teachers of the learners who were blind lacked enough knowledge of Braille. The teachers reported that they taught very few learners who were blind among a large number of sighted learners in their classes. This left them with no option but to concentrate more on assisting the sighted learners and therefore lacked enough time to work with the learners who were blind, a situation which would force them to learn and practise Braille skills. This study would in this case recommend that the number of learners in classes with integrated program for the blind be reduced so that the learners who are blind get their deserved attention from their teachers. In addition, the ministry of education should motivate and encourage special education teachers through better pay and less teaching load to enable the teachers to learn and to practice reading and writing Braille and to pay more attention to the learners with special educational needs.

6. The study found out that to access Braille material for persons who were blind was very difficult and expensive. The teachers complained that they lacked Braille materials for their practice and for teaching their students. It is recommended that the production of Braille materials which is done by the Kenya Institute of Special Education, and other educational stakeholders such as the Kenya society for the Blind, Kenya Union of the Blind, Kenya Institute for the Blind and African Braille Centre in Kenya, be more
subsidised and decentralised to make it more accessible to both teachers and learners.

7. The findings of this study also revealed that the majority of the teachers particularly the sighted teachers in the integrated schools lacked Braille skills. This study recommends that the ministry of education should encourage and motivate those teachers interested in learning Braille by offering training to them. This will in the long run, make it easy for the teachers to interact more effectively with their learners in the teaching learning process.

8. This study found out that Braille facilities and equipment were scarce in the schools under study. This was due to the fact that consideration was not made when finances were annually distributed for the free primary education in schools. This study therefore recommends that schools for learners with blindness be adequately provided with teaching and learning resources.

5.8 Suggestions for Further Study

1. This study emphasised the need for acquisition of competency in Braille by the teachers of the learners who were blind. The study did not investigate the teaching of Braille to the learners. In this sense a further study should be conducted to establish the best approaches and methods of teaching Braille to learners who are blind in Kenya.

2. This study was carried out in special schools and integrated programmes in Kenya. A similar study should be conducted in secondary schools and tertiary teachers colleges in Kenya.
3. The research found out that learners who were blind were not effectively taught how to read tactile graphics in their primary school education. A further study should therefore be conducted at a higher level of education to establish the extent to which the learners with blindness manage to cope with the graphics.
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APPENDIX A

QUESTIONNAIRE FOR THE TEACHERS OF THE VISUALLY IMPAIRED LEARNERS

This questionnaire is made to obtain information which will be used purposely for this study. Please answer this questionnaire to the best of your knowledge. The information you give will be treated with the highest degree of confidentiality.

Put a tick in the appropriate brackets or simply write your answers in the space provided.

1. (i) Indicate the name of your school ________________________________

   (ii) Select from the categories of the school in which you teach

      a) Special ( )
      b) Integrated boarding ( )
      c) Integrated day ( )

      Any other? Specify ________________________________

2. (i) What is your appropriate age range?

      a) 21 – 30 ( )
      b) 31 – 40 ( )
      c) 50 and above ( )

      Any other? Specify ________________________________

   (ii) What is your visual Status?

      a) Totally without sight ( )
      b) Sighted ( )
      c) Partially Sighted ( )
3. (i) What is your educational level?
   a) Secondary
   b) College
   c) University
   Any other? Specify ____________________________

   (ii) What is your academic qualifications
   a) PI
   c) Diploma
   d) Degree
   Any other? Specify ____________________________

4. For how long have you taught visually impaired learners? Please indicate the period of time ____________________________

5. Which class do you teach? ____________________________

6. What subject(s) do you teach? ____________________________

7. which Braille equipments and facilities do you use to teach the visually impaired learners? Please list them.

8. a) Are you trained in Special Education?
    Yes ( ) No ( )
    If yes, in which institution? ____________________________
    b) What certificate did you get?
       Certificate ( ) Diploma ( ) Degree ( )
       Any other? Specify ____________________________

9. Are you competent in reading, writing Braille and reading tactile graphics eg diagrams charts maps etc?
   Yes ( ) No ( )
i) If yes, how did you learn Braille?
   a) Taught at the college ( )
   b) Taught in schools ( )
   c) Taught by my colleagues ( )
   Any other Specify ____________________________

(ii) How do you read Braille?
   a) Through sight ( )
   b) by touching ( )

10. i) How do you assist your pupils who are totally blind in task performance?
   a) I hardly assist them ( )
   b) I ask the class to assist each other ( )
   c) My colleagues assist me ( )

ii) How do you mark their Work?
   a) A pupil reads it for me ( )
   b) A fellow teachers marks for me ( )
   c) Braille transcribers mark for me ( )

e) In what mode of writing do you give assignments, CATs or examinations to your pupils who are totally blind?
   a) In Braille ( )
   b) In print ( )
   c) Orally ( )

11 a) List down challenges that you face in using Braille as a medium of teaching. ____________________________

b) What are your suggestions toward overcoming these challenges?


12. (a) Where does your school get Braille reading materials such as textbooks, set books etc?


(b) List down the types of Braille equipments e.g. Braille writer that are in your school.


(c) How did your school obtain the equipments?

Donations

The school buys

The government provides

Any other? Please specify

13. (a) In your opinion, would you recommend Braille to be an examinable subject?

Yes

No

Please give reasons for your answer
In your opinion do you think all teachers of the visually impaired learners are competent in using Braille as a medium of communication?

Yes ( )
No ( )

13. What would you suggest to be done so as to improve Braille competence by the pupils? 

__________________________________________________________________________

__________________________________________________________________________

A that girls
A child care
She looks at him
Two months later
On the other hand
The morning comes. The old man
And stirs along the path towards the barn
He walks, and near the sexual sun

crosses the sky, he shakes his head.
said, and tilted his nose with delight.
He tells me not to laugh, but to sing. I sing
His lips move, and the sun sets behind him.
Nearly
APPENDIX B

ACHIEVEMENT TESTS

Test one

Braille the following text in Braille grade II

Sun's about to set, it's getting dark.

A cold wind sweeps across the empty land.

This used to be the time for telling stories,

But no one feels like telling stories now.

A thin goat cries for food, but no one hears.

A child stands up and pulls his mother's hand.

She looks at him; her eyes are filled with tears.

Two men are speaking quietly near the hut

"I'm sure our ancestors are doing this,"

The old man says this friend agrees the nods

And goes away. The long cold night begins.

The morning comes. The old man leaves his hut,

And walks along the path towards his farm,

He faces east and sees the cruel sun

His eyes explore the sky. He shakes his head.

A dry wind blows and fills his eyes with dust.

He looks around and sees the brown, dead grass

His shamba down the valley, dust and stones

Nearby, his only bull, a heap of bones.
Test two

Andika maandishi yafwatayo kwa Breli daraja la pili.

Ngamia ni mnyama aishiye jangwani au mahali popote palipo pakavu. Umbo lake linamfia sana, hivi kwamba anaweza kusthimi hali ya jangwani.

Miguu yake imeumbwa ili aweze kutembea bila kuzama katika mchanga tifutifu wa jangwani kwato zake hupanuka akanyangapo juu ya mchanga ndiyo maana hazami. Vilevile anaweza kutembea mahali pa mawemawe ambapo gari haliwezi kupitia.

Pua lake lina uwezo wa kunusa miji ili kuwaongoza watu kwenye miji ambayo ni muhimu sana katika jangwa. Pia pua la ngamia laweza kuzibika iwapo kuna upepo mkali uliojaa vumbi.

Hali kadhalika, macho yake yana kope nyingi ili kuzuia mchanga na vumbi lisimwingie machoni kumpofua.

Ngamia ana uwezo wa kuvumilia njia na kiu kwa muda mrefu. Yasemekana kuwa ngamia ana njia ya kuweka akiba ya miji mwili mwake. Pia ngamia anaweza kukaa muda mrefu bila kula chakula. Midomo yake inamwezesha kuchuna majani kutoka kwenye mimea haba yenye miiba inayoota jangwani.

Mnyama huyu ana manufaa makubwa kwa waishio jangwani. Kwa kuwa watu hawa huhamahama, humtumia ngamia kwa kubeba mizigo yao.
Test three

In the following exercise, write the Mathematical expressions into Mathematical Braille notation.

1. Sixteen squared plus square root of one hundred and forty four equals two hundred and sixty eight.

2. Forty five thousand and sixty nine minus six thousand and two equals thirty nine thousand and sixty seven.

3. Two and three quarters multiply by one and a six divide by one and three eighth equals two and a third.

4. Two Y squared minus X cubed plus y squared equals three Y squared minus X cubed.

5. sixty five percent as a fraction is equal to thirteen over twenty

6. Zero point seven kilometres plus ten centimetres equals seven hundred metres and ten centimetres.

7. One hundred and eighty degrees divide by six plus forty five degrees equals seventy five degrees.

8. A container measures eight centimetres wide by six centimetres long and ten centimetres high. Its volume is equal to four hundred and eighty cubic centimetres.

9. Maina has Q mangoes and Kamau has X plus three mangoes. The total number of mangoes owned by the two boys is equal to Q plus X plus three mangoes.

10. fifteen percent of sixty is equal to nine

11. Three litres divide by ten cubic centimetres is equal to zero point three litres.

12. the difference between twice N and four times N divide by two is equal to N
13. The sum of A and seven multiplied by the sum of a plus three is equal to A squared plus ten A plus twenty one.

14. One million and eight hundred thousand millimetres converted to kilometres equals one point eight kilometre.

15. Fatuma bought a radio for Ksh. One thousand and five hundred shillings and sold it at one thousand and two hundred. The percentage loss was equal to twenty percent.

16. The square root of one hundred and forty four over one hundred and sixty nine is equal twelve over thirteen.

17. Eight point forty four divided by two is equal to four point two.

18. A car travels a distance of four hundred and sixty kilometres in four hours; its average speed will be equal to one hundred and fifteen kilometres per hour.

19. Six men can do a piece of work I four days. The same amount of work will take three men working at the same rate eight days.

20. Sixty three percent as a decimal is equal to zero point sixty three.

21. The length and width of a rectangle is D centimetres and D minus eight centimetres respectively. The area of the rectangle will be D squared minus eight D.

22. One hundred and one thousand, six hundred and three minus one thousand, five hundred and ninety nine.

23. Three eighths is less than half plus a quarter.

24. Six hundred and ninety six hours divide by (twenty four hours times seven equals four weeks and one day.

25. Michael is X years old now. In ten years time he will be X plus ten years old.
Test four

Andika maandishi ya fuatayoyo kwa maadishi ya kawaida

Punde baada ya kula chajio, macho yangu yalilegea na kuanza kuwa mazito kwa usingizi. Niliwaaga wazazi wangu kwa kuwatacia njozi njema na kuelekea chumbani mwangu kwa madhumuni ya kuzama zii katika usingizi mwanana. Nilijibwaga kitandani baada ya kupiga dua kwa Mungu na punde si punde nilikuwa nikiwesekha katika pono la usingizi


Once upon a time, there was a noisy young hornbill that lived in the forest. This hornbill was always shouting about one thing or another. Sometimes he complained that he was hungry. Sometimes he complained about a pain in his big break, a pain in his wings or a pain in his long tail. The whole day long he flew from tree to tree shouting about his problems and the noise he made could be heard all through the forest.

The young hornbill had built his nest in one of the tallest trees in the forest. There was also a little ladybird of virtue that lived on the same tree. She heard the noise which the horn bill made, and she felt worried. “Hornbill will bring trouble to the forest”, she thought “but what can I do about it? If I tell him to keep quiet, he won’t listen. I’m too small. He might even eat me! The ladybird decided to talk to some of hornbill friends who lived nearby.
APPENDIX C

FOCUS GROUP DISCUSSION

The first part: 'icebreaker'

1. The respondents view about short comings in using Braille as a medium of communication.

2. Suggestions to solutions to overcoming the shortcomings.

3. The future of Braille with the coming of the modern computer technology.

4. The place of Braille in an inclusive setting in Kenyan schools as an instructional medium of communication.

Part two: in-depth discussion

5. Respondents views on teachers and learners competency in the use of Braille as a medium of communication

6. The suggestions about improving Braille reading and writing among:
   (a) Teachers
   (b) Pupils who are blind

7. The role of
   (a) The community
   (b) The government towards the provision of Braille equipment and materials in special schools.
APPENDIX D

OBSERVATION SHEET FOR ASPECT OF TEACHING AND CORRECTING ERRORS IN BRAILLE

<table>
<thead>
<tr>
<th>Date:</th>
<th>subject:</th>
</tr>
</thead>
<tbody>
<tr>
<td>School:</td>
<td>syllabus:</td>
</tr>
<tr>
<td>Teacher:</td>
<td></td>
</tr>
</tbody>
</table>

| S | H | C | T | S | B | C | T | S | B | C | T | S | B | C | T | S | B | C | T |
| 1 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 2 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 3 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 4 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 6 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 1 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 2 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 3 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 4 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 5 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
| 6 | 0 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
REPUBLIC OF KENYA

MINISTRY OF HIGHER EDUCATION SCIENCE & TECHNOLOGY

Telegrams: “SCIENCE TEC”, Nairobi
Telephone: 02-318581
E-Mail: ps@scienceandtechnology.go.ke

JOGOO HOUSE "B"
HARAMBEE AVENUE,
P.O. Box 9583-00200
NAIROBI

When Replying please quote
Ref. MOHEST: 13/001/38C/520/2

1st September 2008

Stephen M. Nzoka
Kenyatta University
P.O.Box 43844
NAIROBI

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on, 'Establishing the Braille Proficiency of Primary School Teachers of Learners who are Blind in Kenya,

I am pleased to inform you that you have been authorized to undertake research in all Province and all Districts in Kenya for a period ending 30th August 2010.

You are advised to report to the all Provincial Commissioners and all District Commissioners before embarking on your research.

On completion, you are expected to submit two copies of your research report to this office.

M. GATOBUI
FOR: PERMANENT SECRETARY

Copy to:

All Provincial Commissioners

All District Commissioners