

**TEACHERS' EXPERIENCES IN TEACHING MATHEMATICS TO LEARNERS  
WITH VISUAL IMPAIRMENT IN AN INCLUSIVE PRIMARY SCHOOL IN TAN-  
ZANIA: A CASE OF MITINDO PRIMARY SCHOOL**

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**DECLARATION**

This thesis is my own original work and has not been presented for the award of any master degree in any other institution or university.

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## **ABBREVIATION AND ACRONYMS**

<b>ICEVI</b>	International council for education of children with visual impairment
<b>LWVI</b>	Learner with Visual impairment
<b>MOEST</b>	Ministry of Education Science and Technology
<b>RNIB</b>	Royal National Institute for the Blind
<b>GOK</b>	Government of Kenya
<b>GOU</b>	Government of Uganda



## ABSTRACT

This study aimed at finding out teachers' experiences in teaching mathematics to learners with visual impairment in an inclusive primary school in Tanzania. The study was guided by three objectives, namely; teachers' knowledge and skills in teaching mathematics to learners with visual impairment, the methods teachers use when teaching mathematics and challenges they face when teaching mathematics in an inclusive class.

Qualitative research approach was applied and the study design was case study. It was conducted in one primary school in Misungwi district, Tanzania which offers inclusive education. The study involved eight (8) participants who are mathematics teachers at Mitindo inclusive primary school where data for this study were collected. The data were gathered through the use of semi-structured interview and observation guides. Data were analysed qualitatively based on research questions. The study found out that most of the ordinary teachers have no knowledge and skills on how to teach mathematics to learners with visual impairment in an inclusive class. This has been caused by the inadequacy of inclusive and special education courses offered in the colleges they studied from. The study also found out that the majority of ordinary teachers do not use tactile materials when teaching mathematics to learners with visual impairments. Furthermore, the study revealed that the methods teachers used when teaching mathematics to learners with visual impairment did not suit the needs of learners with visual impairment, which made them not to grasp well the lessons. Conclusions from the study were that teachers lacked knowledge in teaching mathematics to LWVI, methods were not appropriate, materials were not suitable to meet learning needs of learners with visual impairment and classes were overcrowded. The study recommended that the government under MOEST should provide teaching and learning equipment and materials like Perkins Brailers and tactile materials to improve teaching and learning to learners with visual impairment in an inclusive school. Furthermore, the government under the Ministry of Education Science and Technology (MOEST) should increase subvention grants to schools to be able to purchase materials needed when preparing instructional materials that suit the needs of all learners including LWVI in an inclusive class. Special workshops are needed to train teachers on how to make tactile materials. However the government under Ministry of Education Science and Technology should organize regular refresher courses and workshops for teachers to get knowledge on how to teach mathematics to learners with visual impairment in an inclusive school. Likewise, those teachers with little knowledge should be trained through workshops and seminars.

# CHAPTER ONE

## INTRODUCTION

### 1.0 Background to the study

This chapter presents the background to the study, statement of the problem, purpose of the study, objectives of the study, research questions, and scope of the study, significance and definition of terms as well as theoretical framework.

Visual impairment can affect the teaching and learning of individual learners' ability and potential in mathematics regardless of age, gender, race or social economic status.

Over half of the information human beings receive about their world is through vision. Research has shown that over 75% of what we learn is accessed through sight (Sawyer & Bright, 2008, Hurt, 2012). Visual impairment can interfere with development of learning, mobility, social growth and adjustment.

Visual impairment is the umbrella concept encompassing all degrees of visual loss. It is used to mean persons whose vision loss constitutes a significant limitation to perform tasks that require sight (Arditi & Rosenthal, 1998). The two authors go on to say, this can be as a result of disease, trauma or a congenital degeneration that cannot be corrected by any conventional means, including refractive error correction, medication, or surgery.

Persons with visual impairment can be categorized into two, namely blind and low vision (Nielsen, 1997 & Barraga, 1964). Low vision is a term that generally refers to a severe visual impairment whereby the affected person is necessarily limited to distance vision, but also unable to read a newspaper at a normal viewing position or other reading material even with correction (Nielsen, 1997 & Barraga, 1964). Children with low vision can be helped to learn by providing them with optical devices like magnifying glasses, large size print materials and good lighting environment (Corn & Ryser, 1989).

The concept blind refers to a high degree of vision loss such that any residual vision is not useable in performing visual tasks (The Royal National Institute for the Blind -RNIB, 1990). In this study the term “children who are blind” is used to refer to those children who have limitations in performing visual tasks with or without vision devices. Such children may require Braille or non-visual materials for their learning. In this study visual impairment will be used to refer to blindness. Internationally, education is considered as a fundamental basic human right (Universal Declaration of Human Rights, 1948). Article (26) states that every child is entitled to quality basic education offered in a natural environment nearest to his or her home. This led to the introduction of inclusive education.

Inclusive education is a process intended to respond to students’ diversity by increasing their participation and reducing exclusion within and from education (UNESCO, 2009). Inclusive education has been internationally recognised as a philosophy for attaining equality, justice and quality education for all children, especially those who have been traditionally excluded from mainstream education for reasons of disability, visually impaired and other characteristics (Ajuwom, 2008). Individuals living with visual impairment have a right to be in an inclusive classroom setting during the teaching/learning processes. This enables the class teacher and the specialist to make provisions for them in terms of materials and support services.

In Sub Saharan Africa, Tanzania is among the first countries to approve the Salamanca statement, and other various United Nations conventions, that were and are fighting for the rights of education of children with disabilities including those with visual impairment in inclusive settings (TFDPO, 2010). This is because in the beginning, all children with visual impairment were educated in separate classrooms by special teachers. As the result of development of knowledge, special schools were abandoned and inclusive education took over, with the aim of restructuring and reforming the school in the direction that enables all children to be part of all the social and educational opportunities offered in a general school setting. (Mittler, 2000). This therefore ne-

cessitated the inclusion of learners with visual impairment into ordinary schools. Like in other countries around the world such as United States, United Kingdom,, India, ,South Africa, Uganda and Kenya, which are teaching mathematics using braille to learners with visual impairment in schools, Tanzania too, uses the same.

United States experienced significant changes in its system of education for students with visual impairment. Students have increasingly been included in the general education system and are expected to achieve in similar ways as their general education peers. In the United States, schools are now responsible for providing effective instructions to all categories of learners in inclusive educational settings. Schools in America put emphasis on instructions in mathematics. Learners with visual impairment are not left out of this national effort (Kapperman & Sticken, 2003). It has been established that learners with visual impairment learn mathematical skills at the same level as their sighted peers (Tindell, 2006). The methods for delivering mathematics instructions to students with visual impairments are debate, group discussion, and peer tutoring. The use of the Braille Nemeth code and abacus has been established as a beneficial practice for teaching mathematical concepts to students with visual impairments (Kapperman *et al.*, 2000). The Braille Nemeth code gives students who are blind the opportunity to read and write Braille mathematical computations, thereby helping them to build a thorough understanding of concepts presented.

All students, including learners with visual impairment, are expected to be taught, supported, and assessed in the general education environment and curriculum to the maximum extent possible. Teachers are thus expected to be responsible for providing instructions in a way that reduces barriers to learning. This is reflected internationally in the continued growth of inclusion initiatives in the United States, and in other countries that support equal educational access and opportunity for all learners (Brazil, Ford, & Voltz, 2000; Luftig, & Pavri, 2000; Salend, 2000)

Inclusive education in United Kingdom started in the 1980s( Lauchlan F and Greig S, 2015). Children with special educational have been educated in mainstream schools, in order to give them the same education as other children. The areas of science and mathematics have traditionally been inaccessible to students with visual impairments. Mathematics is filled with visually-presented concepts and information. This visual information has not been made available for widespread use in formats easily accessible to blind students (Kumar, Ramasamy, &Stefanich. 2001). In a national survey in United Kingdom, it was found that most mathematics teachers had little or no direct experience in teaching learners with visual impairment. (Minogue, Oppewal, Cook & Broadwell, 2000).

Before 18th Century in India, education was not considered important for the visually impaired persons. Persons with visual impairments were viewed with contempt and lived in ignorance and abject poverty (Rex, Koenig, Wormsley, & Baker, 1995). It was not until the 18th century that people started developing positive attitudes towards persons who were blind and considered them as capable and worthy of being educated.

UNESCO (2000) report reveals that there are around 30 million children in India suffering from some form of disability, among India's 200 million school-aged children (6-14yrs), 20 million require Special Needs Education, and less than 5% of children with disabilities are in schools

Vision allows access to information that helps build a conceptual understanding of basic mathematical concepts. Consequently, learners with visual impairments tend to face more challenges than their peers without disabilities, even when learning the most basic mathematical concepts (Beal & Shaw, 2008). These difficulties include problem solving, gaining access to the problem information, representing problem information, and calculating the answer.

Special education in Thailand was established in 1939 with the first establishment of the school for the blind (Sukbunpant, Shiraihi, & Kuroda, 2004). In Thailand, the first school for individuals with blindness was established in Bangkok in 1935 with the support of Ms. Genevieve Caulfield, an American lady with blindness (Vorapanya & Dunlap, 2014). Children with other disabilities beside blindness were refused admission. They did not have an opportunity to attend schools like other children without disabilities. Until the 1950's the government began to support special education for children with visual, hearing, physical, and intellectual impairments. Since then, children with disabilities have an opportunity to attend education in inclusive schools (Kritzer, 2012). Studies by Adelakun (2006) show that students with visual impairment performed mathematics equally well with their sighted peers when taught selected topics with adapted materials.

In Nigeria Special Needs Education started in early 1970s under the umbrella of different religious or voluntary groups in which schools for the blind and deaf were hence introduced. In 1975 the government took over and there were schools established that made it possible for learners with special needs to learn alongside with ordinary learners (Eneh, 2011). In the National Policy on Education (FRN, 2004) the Nigerian government made basic mathematics a compulsory subject both in primary and secondary. Failure in mathematics was usually a yardstick to determine promotion from one class to another during this period (Rowe, 2014). Many courses require applicants applying to tertiary institutions to take mathematics as part of the Unified Tertiary Matriculation Examination (UTME) (Buhagiar, & Tanti, 2011). This has made it hard for learners with visual impairment fail to meet the needs of the government.

Some challenges that students with visual impairments encounter when learning mathematics can be overcome if the content is taught in an appropriate manner such as using programmed instruction (Agrawal, 2004). Programmed instruction, which includes developing a sequence of

instructional activities, has the potential to maximize learning and increase motivation for students with visual impairments (Agarwal).

In south Africa the provision of education for learners with disabilities including those with visual impairment has been part of the process and the development of an inclusive education system can be traced back to the nation's founding document, the Constitution of the Republic of South Africa,(1996) Act No. 108. Section 29 (the Bill of Rights) that states that everyone has the right to basic education, including basic adult education; and to further education, which the state through reasonable measures must make progressively available and accessible. The policy asserts that in order to make inclusive education a reality, there needs to be a conceptual shift regarding the provision of support for learners who experience barriers to learning.

In South Africa, the economic activities of South Africa are based on industrial work. This has compelled the government of the Republic of South Africa to make mathematics become a compulsory subject to everyone in the academic circles. This, to some extent, has hindered blind people from accessing the abundant employment opportunities due to poor response to mathematics (South African Council for the Blind, 2016).

In Kenya the government has enshrined in the national policy and legal instruments (GOK, 2001), GOK, 2005), GOK, 2009) & GOK, 2012) all in recognition of education of the learners with special educational needs in the mainstream. Efforts to meet obligations under the Kenyan laws and international commitments have also been demonstrated in the implementation of Educational for All (EFA) (2000) and Millennium Development Goals (MDGs) (2000-2015), in an effort to make education more responsive to the needs of all its citizens in the Kenya.

Efforts to implement Education For All including those with disabilities by the government in reforming the education sector translated into the increase in the pupils' enrolment at primary school level and by the end of 2010 there were 9.4 million, compared to 6.1 million in 2002, courtesy of Free Primary Education (FPE)

In Kenya, mathematics is used as a basic entry requirement into any of the prestigious courses such as medicine, architecture and engineering because it is noted by society as a foundation of scientific and technological knowledge that is vital in social economic development of the nation (Wanjiru, 2006). Due to the importance of mathematics, the subject has been made compulsory and an examinable subject in primary and secondary schools in Kenya (Wanjiru, 2006). This is so because when learners in primary schools complete their primary school education cycle they may not be limited in career choice and advancement (Wanjiru, 2006).

One of the principles underlying implementation of education policies in Uganda is that of inclusive education. That is why government, in January 1997, introduced Universal Primary Education (UPE) which was followed by Universal Secondary Education (USE) in 2007. This is shown in the Persons with Disability Act (2006) and is consistent with international standards set out in the 2006 UN Convention on the Rights of Persons with Disabilities (UNCRPD) and the UN standards on Equal Opportunity (2000). The belief is that when a blind child is enrolled in a school with good physical environment, the child can learn within an ordinary setting.

The situation of blind learners in Uganda being taught or getting involved in mathematics lessons at the setup of schools was impossible as they were not allowed to join school, firstly, because it was believed they did not have the ability to perceive any concepts at school because of their disability and there was no way they could be assisted since learning at that time only catered for non-visually impaired learners (Ssentanda, 2004).



Implementation of Inclusive education in Tanzania started in 1998, after the Salamanca Conference of 1994, which aimed at promoting education as a basic human right requiring policy that could serve all learners, regardless of their physical, intellectual, social, and emotional condition (UNESCO, 1994). Implementation of inclusive education in Tanzania was thus, started by the government in cooperation with the Salvation Army and UNESCO when a pilot project was conducted in Temeke district in the Dar es Salaam region (Tungaraza, 2012). After introduction of inclusive education, there was high enrolment of pupils and students with disabilities from 2006-2011 in primary schools as well as in secondary schools (MoEVT, 2011)

By the year 2001, the government of Tanzania introduced the Primary Education Development Program (PEDP) which among other things, intended to provide quality education and vocational skills for each and every learner in the community (Polat, 2011). Up to the year 2010, there were 196 inclusive primary schools in the country compared to 4 schools in 1998 (Tungaraza, 2012). Although the Tanzanian government is working hard to increase the number of inclusive schools, teaching and learning is not accommodative for learners with disabilities especially, those with visual impairments (ICC, 2008). Even for those who are already accessing inclusive education, the education provided does not seem to meet their needs (ICC, 2008).

The government of Tanzania has been trying to promote inclusive education by ensuring that all citizens receive education. In spite of achievements in the enrolment of learners with visual impairment into inclusive schools to date the ratio between professional teachers' in the field of Special Needs Education is still a challenge. For example in Misungwi district there are 1644 general teachers in primary schools of which 21 teachers are trained in the field of Special Needs Education. Most ordinary teachers fail to implement inclusive education, and at the same time the whole concept of inclusive education and its practice is a dilemma to them (Miles, 2003; Ainscow, Kangwa, Kisanji, Leis, Mmbaga, & Mumba, 2003).

In Tanzania, teachers are trained ordinarily to teach ordinary learners. This is a challenge to teachers who are teaching in inclusive schools due to the nature of training where Braille is never taught to student teachers.

In Tanzania, mathematics is a core subject that every student is required to study at both primary and ordinary secondary school. Therefore, trained teachers in the field of Braille mathematics are needed to assist visually impaired learners to do well.

### **1.2 Statement of the problem**

Ordinary teachers have seemingly not been equipped with specialized skills in teaching mathematics to learners with visual impairment in schools yet they are allocated to teach classes where learners with visual impairment are placed. The study seeks to find out how ordinary teachers who are not trained in the field of Special Needs Education are teaching mathematics to learners with visual impairment in an inclusive school.

### **1.3 Purpose of the study**

The purpose of the study was to investigate teachers' experiences in teaching mathematics to learners with visual impairment in an inclusive primary school in Tanzania.

### **1.4 Objectives of the study**

The objectives of the study were:

1. To examine teachers' knowledge and skill in teaching mathematics to learners with visual impairment.
2. To examine methods used by teachers when teaching Mathematics to learners with visual impairment.

3. To analyse challenges faced by teachers when teaching mathematics to learners with visual impairment.

### **1.5 Research questions**

The study was guided by the following research questions:

1. What kind of knowledge and skill do teachers have in teaching mathematics to learners with visual impairment?
2. What methods do teachers use when teaching mathematics to learners with to learners with visual impairment?
3. What challenges do teachers face when teaching mathematics to learners with visual impairment

### **1.6 Scope of the study**

This part explores the parameters in which the study was operating. They were the shortcomings, conditions or influences that could not be controlled by the researcher and restrictions on the researcher's methodology and conclusion. Any limitations that influenced the results were mentioned.

#### **Content scope**

The scope of the study was to investigate teachers' experiences in teaching mathematics to learners with visual impairment in an inclusive primary school in Tanzania. Through this the researcher was able to anticipate how the learning process was conducted by interviewing them as well as observing what they were doing.

#### **Participant scope**

Teachers were the main participants in this study whereby the study involved eight (8) teachers as participants, in their participation the data was obtained through one on one interview and observing the teaching activity taking place.

### **Geographical scope**

The study was carried out at Mitindo inclusive primary school in Mwanza region, Misungwi district in Tanzania. Mitindo inclusive primary school was the only inclusive school which was located in the centre of the district where it was easy for all pupils around the district to reach to the place. Misungwi was among 7 districts found in Mwanza region. Misungwi was surrounded by Nyamagana District, Kwimba district and Magu District. At this school many lessons were taught but the study focused on teaching mathematics to learners with visual impairment in an inclusive primary school.

### **Time scope**

The study took place between August 2018 and July 2019. During that time the researcher visited Mitindo inclusive primary school and conducted interviews with the teachers, and noted down the responses.

### **1.7 Significance of the study**

This study might help teachers to make selection of learning materials to use when teaching mathematics to learners with visual impairment. It is hoped that by going through this work, teachers will be able to apply appropriate methods of teaching during teaching mathematics in inclusive classroom. The study also might help head teachers to seek assistance from Ministry of Education Science and Technology to train teachers in the field of Special Needs Education.

## **1.8 Limitations of the study**

The current study faced various challenges, which occurred during the research. One of them was about the participants that hid some vital information required or might have provided false responses during interview sessions. To overcome this challenge, semi structured interview was used in order to seek more information by probing for more responses.

Another challenge was the schedule to interview teachers and observe lessons in that teachers were teaching in different times hence this situation was really interfering with the time which was planned for the research to be done. To get over this situation, the researcher had to find time when participants were free to meet in the interview section.

Mathematics lessons are taught in morning hours so it was a tight timetable for the researcher to be able to observe only one lesson per day which took much time. To overcome this, the researcher requested teachers to have some mathematics lessons after break time to be able to observe at least two to three lessons per day.

Finally a lot of time was required in conducting interviews with all participants. The researcher worked under a tight schedule, but she was able to get in-depth data.

## **1.9 Definition of terms**

**Visual impairment:** refers to a significant loss of vision, even though the person may wear corrective lenses.

**Learner with Visual impairments:** is one whose vision is not enough to support access to print.

**Skill** is the knowledge and ability that enable someone to do something well.

**Ordinary teacher** is someone who is trained to teach sighted learners.

**Mathematics** is the science that deals with the logic of shape, quantity and arrangement.

**Inclusive education** is the process of addressing and responding to the diversity of needs of all learners through increasing participation in learning, cultures and communities, and reducing exclusion from education.

### **1.10 Theoretical Framework**

This is guided by Thorndike's (1898) theory of learning which says that learning takes place through a process of trial and error. A learner makes a number of trials, some of which the responses do not give satisfaction to the individual but that the individual has to go on making further trials until satisfaction is achieved. Thorndike's theory of learning uses three laws of learning which comprise: readiness, exercise and effect.

#### **Law of readiness**

According to Thorndike (1898), learning takes place when an individual is ready to learn. His emphasis is that learners must be prepared in order to learn, and learning needs self-preparation of the mind in order to get the required knowledge. The teachers should ensure that learners are ready by preparing them psychologically and they should be creative by using adapted materials resourced from the local environment to capture the learners' attention. It is further observed that teachers must consider readiness of the students to promote their success in learning and lack of readiness can cause the learning process to be incomplete.

In case of learners learning mathematics, the teacher needs to improvise tactile materials, make brailled diagrams and embossed diagrams to enable the learners grasp the content taught. When the learners are actively involved in learning mathematics with materials exploration, and the teacher allows the learners to ask questions, it is obvious that learners will be able to grasp the

content. At this point the teacher might present abstract materials in form of tactile materials to the learners when teaching mathematics to any category of learners with visual impairment.

### **Law of exercise**

As far as the law of exercise is concerned, Thorndike argues that learners should have adequate practice in order to increase efficiency and durability in learning. The Law of exercise is split into two parts: law of use and law of misuse.

Thorndike (1898) discovered that learning becomes effective through practice or exercise. He argues that skills acquired and practised are useful and cannot be easily forgotten, but anything that is not used or exercised or practised for a certain period will always be forgotten. It is further argued that teachers should encourage learners to practise what they have learnt in order to master and retain for a longer period of time (Aggarwal, 1994). Exercise is believed to have a positive impact in learning something. Aggarwal added that learners must have exposure to variety of tactile materials so that when learning mathematics, they are able to grasp ideas easily and make the information stick in their minds permanently.

### **Law of effect**

According to Thorndike (1898) the law of effect emphasises reinforcement or feedback in learning. He points out that when reinforcement is used well in learning, it always strengthens the response within a learner. When the learner answers well, the teacher can use rewards to strengthen the responses from the learner. This then encourages the learner to keep on trying time and time again. Thorndike discourages the use of punishment. He argues that punishment does not always weaken the responses. He places more emphasis on the reward aspect which he believes is stronger than the punishment. Thorndike advises that a teacher ought to give feedback after marking learner's work, so as to enlighten areas on which they can do appropriate correction.





## CHAPTER TWO

### LITERATURE REVIEW

#### **2.0 Introduction**

This chapter presents literature review that concerns the subject of study under the following subheading; teachers' knowledge and skills in teaching mathematics to learners with visual impairment, methods used when teaching mathematics to learners with visual impairment, and challenges faced by teachers when teaching mathematics to learners with visual impairment.

#### **2.1 Teachers' knowledge and skills in teaching Braille mathematics to learners with visual impairment**

The success or failure of any innovation in teaching ultimately lies on the receptiveness and flexibility of the classroom teacher. Learners with visual impairment can be good achievers in Mathematics if an emphasis is put on concrete experiences to enable them develop appropriate skills. This may be the reason why visually impaired pupils are poor in mathematics at all levels in education and employment.

A study by Kesiktas and Akcamete (2011), sought to determine the degree to which the professional standards for Turkish teachers at pre service and in service were implemented. One of the findings of the study showed that, there was insufficient knowledge and skills among teachers regarding implementation of inclusive teaching for students with visual impairments. In line with argument, the study showed that most teachers were not special education teachers and so they often had to use the "trial and error" method to find out the best way of teaching their blind learners (Kohanova, 2013). The study also revealed that teachers used inappropriate methods of teaching and they did not know how to use abacus (Bayram, Corlu, Aydin, Ortactepe, and Alapala, 2015).

A study by Stacy (2013) focused on education of LWVI in East, Southern and Central Africa (ESCA). Found out that there was need to change training modality for teachers by introducing new processes and training that is less costly and more time efficient. The education reviews conducted in Sierra Leone, Ghana, Nigeria and Tanzania revealed the need for teachers to possess a strong knowledge of Braille and also receive specific training on teaching Mathematics to LWVI.

In a study done in South Africa by Maguvhe (2014) to explore teaching science and mathematics to students with visual impairment, the participants opinions revealed that teachers lacked specialist training to teach blind learners, and that there was no rigorous supervision during their teaching practices. This was due to that fact that they were not competent in transferring knowledge to learners with special learning needs, particularly the blind learners (Maguvhe, 2015).

In line with the argument raised by Maguvhe, education review conducted in Sierra Leone, Ghana, Nigeria and Tanzania by Stacy (2013) revealed that there was need for teachers to possess a strong knowledge of Braille and also special training on teaching mathematics to LWVI. Stacy added that mathematics teachers did not know Braille skills but use trial and error when teaching.

Other empirical studies conducted in Slovakia by Kohanova (2013) which also indicated that most teachers who taught LWVI were not Special Needs Education teachers and hence they used trial and error in teaching. The study by Maguvhe (2015) in South Africa discovered the same. The study revealed that teachers were not well trained to teach blind learners, and that they lacked the necessary innovation to mobilize resources for the teaching of science and mathematics.

## **2.2 Methods used by teachers when teaching mathematics to learners with visual impairment**

The success of teaching and learning process depends on the methods used when teaching and availability of effective teaching materials. If a specially trained teacher teaches the learner with visual impairment, use participatory methods during teaching and learning process will most likely lead to improvement of the learners' performance.

A study was conducted in Uganda by ICEVI (2005) to investigate the educational inclusion of children with visual impairment. The findings showed that in order for children with visual impairment to be successful in learning mathematics, there was need for the availability of specialist teachers, Braille, learning materials, availability of tactile equipment and tools and appropriate teaching methods that suit the needs of all learners. The study emphasised that better teacher preparation and availability of assistive devices were key factors for a success in learning mathematics. The study emphasised the use of traditional Braille equipment like the Perkins Braille, the slate (also known as hand frame) machines, such as laptop computer speech synthesizer, talking calculators, Braille tablets with Braille display devices which can be applied to improve teaching and learning concept to learners with visual impairment (RNIB, 2016). Another study done by Polat and Kisanji (2009) revealed that many inclusive classrooms in Tanzania have large number of students with an average of 80 students per class. This situation may threaten the use of participatory methods, and therefore affecting the quality of teaching in these schools. Kilulu, (2010) did a study on the challenges facing teachers' and pupils in Inclusive Primary Schools in Tanzania and the findings revealed that majority of inclusive schools had no visual and learning materials,

Furthermore, the study by Moodley, (2012) found out that in order for the learners to be active participants in the learning and teaching process, institutions must ensure that teaching and learn-

ing materials are used as well as made available to all learners with visual impairment according to their needs. Lewis and Little (2007) conducted a study with an intention of providing insight on the current situation of inclusive education in four countries, namely Nepal, Tanzania, Vietnam and Zambia. The findings of the study in Tanzania revealed that, teachers were not educated enough in the use of Braille materials, tactile diagrams and maps etc. unlike other countries.

Kayombo, (2010) studied teachers' competency in handling learners with disabilities in inclusive primary schools in Tanzania. The findings showed that methods employed by teachers in inclusive classrooms were inappropriate. For instance, questions and answers, and lecture methods were the most teaching and learning methods used by the teachers. Kayombo concluded that these methods will not make LWVI to benefit from the lesson; they will end up hating mathematics.

The Education Commission's Reports of Gachathi (1976) and Mackay (1981) suggested that teaching should be learner-centred so that learning becomes more relevant to the learner. Gachathi further recommends that schools teach basic computational skills for solving problems. This emphasizes the need for the learner's active participation in the classroom activities. This also implies that the teacher's role is to offer opportunities that will lead to learner-centred activities in class which would enhance performance in mathematics and such opportunities could be realized if teachers used teaching methods that encourage learners' participation in class. This study sought to establish the challenges that teachers of mathematics to learners with VI face when applying teaching methods that are used by teachers in an attempt to enhance performance by making learners adaptable to mathematics learning and then offer possible solutions to solve this problem.

### **2.3 Challenges faced by teachers' when teaching mathematics to learners with visual impairment.**

Vision allows access to information that helps build a conceptual understanding of basic mathematical concepts

A study conducted in South Africa by Maguvhe, (2014) with an intention of exploring teaching science and mathematics to learners with visual impairments revealed that teachers lack specialist training to teach learners who were blind, thus not competent enough to transfer their knowledge to learners with special learning needs, particularly to learners who were blind. Teachers found difficulties in enabling their learners to understand geometrical drawings of cubes from a perspective view due to visual experiences, the basis for making them fail in enlarging and minimizing two dimensional forms (Kohanova, 2013). The study showed that teachers of learners with visual impairment had limited Braille mathematics notation knowledge.

A study conducted by Mwakyeja (2013) investigating the way general teachers teach students with visual impairment in inclusive classrooms and the challenges facing them in primary schools. The findings indicated that there was little knowledge about inclusive education among general teachers. In addition, the knowledge about inclusion and teaching in inclusive classrooms was highly needed by the general teachers as there seemed to be a need for the preparation of the teaching resources and instructing students with visual impairment about the proper ways of using their visual devices. The findings further showed that the general teachers were not using the little knowledge they had on teaching inclusive classrooms due to challenges like lack of commitment among them, lack of the resources and a rigid curriculum. Rigid curriculum is also a problem for implementation of inclusive education Mwakyeja, (2013). Teaching methods and examination systems are centrally contradicting with the efforts to make inclusive environments for all children regardless of their learning differences.

Therefore, teaching methods did not consider the needs of learners with special needs. Learners with visual impairment were present in the classes, but teachers were teaching as if all learners were sighted using “talk and chalk” strategy and this was more so with general teachers. This caused learners with visual impairment to drop out due to negative attitudes general teachers had towards learners with visual impairment that they cannot manage to do mathematics subject since they are blind.

However, findings from a study done in Zambia by Simalalo, (2006) investigating challenges in teaching and learning mathematics to LWVI showed that most teachers were incompetent to teach learners with VI and hence some of them did not know mathematics signs in Braille resulting into poor teaching.

Another finding was concerned with overcrowded classes and revealed that the rate of enrolment in primary schools has exceeded teacher student ratio, which has resulted into crowded classrooms and learners with visual impairment lack support needed in the classroom.

In line with the argument the study done in Tanzania by Polat and Kisanji (2009) revealed that many inclusive classrooms in the country had large number of students with an average of 80 to 120 students per class. This situation may threaten the use of participatory methods, and therefore affecting the quality of teaching in these schools. Another study done was done by Krohn-Nydal, (2008) on Development of inclusive education in Tanzania. The findings revealed that there are large numbers of students in classroom. This caused teachers not to be able to attend to all learners in the class.

Kilulu, (2010) did a study on the challenges facing teachers and pupils in Inclusive Primary Schools in Tanzania and the findings revealed that 90% of the inclusive classrooms were small and overcrowded with more than 65 learners in one class. This is hard for one teacher to be able to teach and accommodate LWVI in the big class like that.

On the other hand, Najjingo, (2009) conducted a study about the challenges of accessing all inclusive education services by children with disabilities in Uganda. The findings showed that there are overcrowded classrooms, (ratio: teachers- learners: 1:100). This is a challenge to teachers who are teaching mathematics to LWVI in an inclusive class. It is also a challenge to LWVI who may not get any assistance and thus failing to understand mathematics subject.

Another finding from the study was workload to the teachers in which it was revealed that teachers have many lessons to teach per day and therefore failed to give remedial attention to learners with visual impairment after class hours. The study on learning achievement of pupils with disabilities in inclusive primary schools in Tanzania by Senkondo, (2010) found out that there were overcrowded classrooms and large number of periods per teacher which caused teachers not to have time to help LWVI where they did not understand while in class.

### **Research gap**

Based on the literature review, many studies have focused more on investigating teaching mathematics to learners with visual impairment and ordinary learners in mainstream and special schools. As it is shown above, none of the reviewed studies had focused directly on ordinary teachers in inclusive schools seeking their views, experiences and challenges they faced when teaching mathematics to learners with visual impairment. Furthermore, there are few empirical studies on inclusive education at the primary school level in Tanzania which have been conducted. Thus, in order to cover the existing knowledge gap, it was very important for the current study to investigate on teachers' experiences in teaching mathematics to learners with visual impairment in an inclusive primary schools setting in Tanzania.

## **CHAPTER THREE**

### **METHODOLOGY**

#### **3.0 Introduction**

This chapter presents a description of the process that the researcher undertook in carrying out the study. These included; research paradigm, research design, area of study, study population, sample, sampling technique, data collection tools/methods, procedure for data collection, data analysis and ethical considerations.

#### **Research Paradigm**

The study employed Interpretivism research paradigm. Social Interpretivism believes that individuals seek to understand the world in which they live and work by developing subjective varied and multiple meanings of their experiences. The researcher therefore, looked for the complexity of participants' views of the situation being studied rather than narrowing meanings into a few categories or ideas (Creswell, 2014). The paradigm believes that reality is socially constructed and reality is upon the individual's perception. Researcher chose interpretivism paradigm because there was need to understand the nature of learning mathematics to visually impaired students, their beliefs and other peoples' views. Also this paradigm researcher will check the way teachers transfer mathematics knowledge to students with visual impairments and teaching approaches they employed in teaching them.

#### **3.1 Research Design**

The study employed a case study design as a strategy of inquiry. A case study is usually a study of a single case or a small number of cases (Starman, 2013). Kothari (2014) notes that the case



study method is a very popular form of qualitative analysis and involves a careful and complete observation of a social unit, be that unit is a person, a family, an institution, a cultural group or even the entire community. Baxter and Jack (2008) notes that case study enables the researcher to gather data from a variety of sources and to interpret the data to illuminate the case.

The choice of this design is driven as noted by Johnson and Christensen (2016) who observes that case study research is more varied than phenomenology which focuses on individuals' experience of some phenomenon. This suited the study since the study collected qualitative data which the researcher focused on provide a detailed account of one or more cases.

### **3.3 Area of study**

The study was carried out in Mitindo Inclusive primary school in Mitindo parish, in Misungwi district. . The District has both rural and urban settings and is multi-cultural. The school was selected for the study because it is the oldest school which offers inclusive education in Mwanza region. In Mitindo Inclusive primary school there are many learners who are visually impaired who find difficulties to learn mathematics in an inclusive class.

### **3.4 Population of the study**

Abed and Oliva (1999) and Kombo and Tromp, (2006) define population as a larger group from which the sample is taken. It also refers to an entire group of persons or elements that have at least one thing in common .The target population for the study included; ordinary teachers who are teaching mathematics in an inclusive school. The overall number of learners at Mitindo primary school is 2000 while the teachers are 23 (School Staffing & Enrolment, 2018).

### 3.5 Sample Size and Sampling Technique

#### 3.5.1 Sample Size

Sample size can be defined as a subset of population that is selected for investigation purposes. It involves a process where a Researcher extracts from a population a number of individuals so as to represent adequately the large group (Goetz and Leompte, 2000). So the sample size in this study was 8 respondents. The researcher needed (n=8) teachers teaching mathematics to LWVI because they have varied experiences on teaching mathematics in inclusive setting.

**Table 1: Categories and expected number of respondents**

Group	No of Respondents
Teachers	8
Total	8

#### 3.5.2 Sampling Techniques

Purposive sampling technique was used for selection of teachers to represent the population. The overall number of teachers at Mitindo primary is 23. Mathematics teachers who teach LWVI were purposively selected based on their experience of teaching students with VI in an inclusive class. According to Saunders *et al* (2000), purposive sampling is one of the best systematic techniques of choosing a group of individuals that is a small number of people and enough to be representative of the population from which it was selected because it is difficult for the researcher to cover the whole population without taking a sample. Teachers who teach mathematics were

purposively selected because they have rich information about its teaching and learning to learners with visual impairment. Therefore, purposive sampling method was applied in this study.

### **3.6 Methods of data collection**

The study employed two methods of data collection; that is Interview and observation to gather the required information. Data collection methods are procedures that are used to collect data from participants of the study (Yaya, 2014). Below is the detailed description of each method.

#### **3.6:1 Interview**

Interview is a kind of social interaction in which there is exchange of information or views between a researcher and the participant. It involves verbal stimuli in form of questions from the interviewer and the respondent reply by giving responses verbally. Mason (2002:62) argues that “qualitative interviews may involve one-to-one interactions, and may take place face to face, or over the telephone or the Internet,

The study used semi-structured in-depth interview, because it captures data from respondents as required. Kiomoka, (2014:39) supports the above view by saying that, “conducting face to face interview enables the respondents to tell the interviewer a lot of information and also helps in managing the information provided by the respondents through probing questions. This method through the establishment of trust and rapport with the respondents is likely to gather more information that could not be obtained by any other method of data collection. By using interview method, the researcher collected data on teacher’s level of knowledge, methods used in teaching mathematics and challenges teachers face.

### **3.6:2 Observation**

Observation is the systematic way of collecting data primarily through seeing or observing the phenomena, and recording what is observed. Pandey and Pandey (2015) comments that observation method seeks to ascertain what a person thinks and does so by watching him/her in action as they express themselves in various situations and activities

Observation provided more detailed and new information in addition to the interview, about how mathematics instruction is done to visually impaired students and how visually impaired learners learn mathematics subject in and out of the classroom. In this study, the researcher played the role of non-participant observer. A non-participant observer is one observing the situation without active participation in what is taking place in the research field. This type of observation does not require prolonged time for an observer to engage in a social setting where the phenomenon is being studied (Bryman, 2004).

This type of observation was chosen because of the limited time that was available for data collection. The duration of observation depended on the length of the lesson a teacher had intended to use in the class since it was the aim of this study to observe in detail the whole teaching process, how teachers adapt their teaching to suit needs of students with visual impairments from initial stages to final stages of teaching. The behaviours observed from teachers were recorded through writing notes immediately as the behavior was occurring. Gay, Mills, & Airasian (2009) recommend that, it is better to take notes during observation to avoid some information being forgotten or being distorted, a situation that may occur when data are recorded after observation session.

### **3.7 Procedure for Data collection**

Data were collected through semi-structured interviews. The semi structured interviews were designed for all participants because they are flexible in questioning and responding. The research tools were approved by supervisor. The researcher obtained an introductory letter from the Department of Special Needs Studies, Kyambogo University. The letter was taken to the District Education Officer of Misungwi district seeking permission to carry out the study in their respective school. With the help of the Head teacher of Mitindo inclusive primary school, participants' identification was carried out and appointments were made with the selected respondents.

Agreement to participate in the study was sought and confidentiality was promised to respondents. The interviews were conducted at Mitindo inclusive primary school where all respondents were available. This was done by interviewing one by one in a school setting at the most convenience place.

Recording of the responses was done concurrently with the interview process because many issues were discussed in detail and if unrecorded immediately they would have been altered or forgotten. Concurrent paper recording was used for respondents who did not want to be recorded on tapes. Interviews were conducted using interview guides for respondents. The duration of these interviews was generally between 15 to 30 minutes.

The researcher prepared observation guides to guide and maintain the topic. During mathematics teaching and learning sessions, the researcher observed and took note of the things as laid down in observation guide.

### **3.8 Data analysis**

Data were analysed qualitatively based on the research questions and objectives. All data collected from the field was carefully analysed by the researcher, edited, coded, classified and tabulated

following the thematic analysis procedure. To analyse qualitative data, the researcher transcribed the discussions of both the interviews with the teachers. The researcher then read through the voices transcribed, used a coding list to code the data in order to link them to different themes of the findings to obtain emerging themes. Each datum obtained from interviews and observation was translated from the short notes, analysed in regard to the respondents' perceptions on teacher's experiences in teaching mathematics to learners with visual impairment in an inclusive school

### **3.9 Research Validity**

To establish validity of the instruments applied, the researcher conducted a study by looking at one issue from different angle using more than one method of data collection. This shows that the findings presented were drawn from participant's original views. The data was collected during observation and long interviews or long lasting engagement in the field with participant. This helped the researcher to get rich information. The researcher identified the problem and focused on it in order to get in depth information.

### **3.10. Ethical issues**

The researcher obtained consent from all the respondents with extreme respect, professionalism and confidentiality while handling them. All participants were asked to give informed consent and participate on voluntary basis. Benefits of the study were explained to all participants. In addition, all the information in text books, journals, other dissertations or sources were acknowledged and all the collected data were managed without any manipulation.

## **CHAPTER FOUR**

### **PRESENTATION, ANALYSIS AND INTERPRETATION OF FINDINGS**

#### **4.0 Introduction**

This chapter presents and analyses the results of the research findings carried out at Mitindo inclusive primary school, which focused on teachers' experiences in teaching learners with visual impairment in an inclusive primary school in Tanzania. The chapter has been arranged following the objectives: Specifically three research objectives were addressed: teachers' knowledge and skills in teaching mathematics to learners with visual impairment, methods teachers use when teaching mathematics learners with visual impairment, and challenges teachers face when teaching mathematics learners with visual impairment. The data were collected using semi-structured interview and non-participatory observation methods among teachers teaching from standard 3 to standard 7, who are ordinary teachers and teachers who are trained in the field of Special Needs Education in Mitindo inclusive primary school.

To protect the respondents anonymity, pseudo names in form of letters and numbers were used as follows MtP-3 means mathematics teacher in primary 3, MtP-3B means mathematics teacher in primary 3B, MtP-4 stands for Mathematics teacher in primary 4, MtP-5 means mathematics teacher in primary 5, MtP-5B means mathematics teacher in primary 5B, MtP-6 means mathematics teacher in primary 6, MtP-6B means mathematics teacher in primary 6B and MtP-7 means mathematics teacher in primary 7.

#### **4.1 Teachers' knowledge and skills in teaching mathematics**

The role of teachers in the teaching and learning process is very important as they guide students to learn swiftly. Thus the investigator was interested in finding out if teachers had knowledge and skills of Braille mathematics. The findings show that majority of respondent (5) have no knowledge and skills of braille mathematics.

You know some of us teachers do not have knowledge and skills, so we do not know how to meet the needs of LWVI, when teaching Mathematics,

Furthermore, respondents among teachers had the same opinion that there were not enough trained and knowledgeable teachers to handle inclusive classes, a factor that forced regular teachers to teach inclusive classes.

One of the respondents among teachers had this to say:

For me, I am not trained and I have no knowledge to teach learners of this kind but here I am teaching them. Which means to meet the needs of these LWVI is not easy, as I do not know how to do it. (MtP-4)

However, some trained teachers (3) reported that they have Braille knowledge, but they did not apply it because of the too many lessons they have and that preparation of one lesson takes much time.

I have Braille knowledge, but it is hard to apply it in the inclusive class because preparation of one lesson takes time and yet I have other classes to teach which has learners with visual impairment. (MtP-5)

Furthermore, the data obtained through observation indicated that there were not enough trained teachers in the observed school. Findings further revealed that the teacher-student ratio was also a problem. For example, classes had about 100 and above learners who were being attended by one teacher at a time though learners had varied learning needs. The findings revealed that the teacher in that class was a general teacher who was unable to control the class and cater for all learners.

The investigator observed the level of teacher's knowledge in teaching mathematics to learners with visual impairment. The findings showed that majority of teachers had no knowledge of teaching mathematics to LWVI and so they do not prepare learners' work in Braille format. LWVI depend on sighted learners. On the other hand findings show that teachers are unwilling to



help LWVI but the investigator was interested in finding out the reasons for such unwillingness among the teachers. The majority of respondents argued that teachers were lacking motivation to perform their duties due to insufficient salaries and big workloads.

The use of Braille when writing tasks for learners with visual impairment was investigated. The investigator wanted to find out if teachers prepare learners work in Braille format. The respondents (5) reported that they do not prepare learners' work in Braille.

One of the respondents argued that:

There is no need to prepare Braille assignment to learners with visual impairment. Since they can hear their fellow pupils can read for them and they will be able to do the work without any problem (MtP-6)

Another MtP-4 argued that:

I do not have time to prepare Braille assignments. It is not easy to prepare lessons that suit the needs of all learners in an inclusive class. After all I have many subjects to prepare so I do not have time.

Furthermore MtP-5 was able to prepare learners assignment in Braille. It was easy for the LWVI to do their work without difficulties because their needs were catered for. She said that

I can prepare Braille assignment to LWVI and this is because they are few in number.

More so the data obtained through observation technique was contrary from the interview above. There was no kind of brailed work prepared to learners with visual impairment instead they depended on their fellow sighted learners.

When the respondent were asked about checking learners' exercise written in Braille format, the findings show that majority of the teachers ( 6) do not check learners' work,

One teacher said:

I don't check learners' work, this is due to that LWVI most of them are seated in the middle of the class while few sit at the back of the class which is hard for me to reach them and check their work because of over crowdedness (MtP-3)

Another teacher (MtP-6B) argued:

Due to overcrowded classes, it is not easy for the teacher to move around checking learners with visual impairments work; Learners with visual impairment wait for their fellow learners to finish their work and read for them. So there is no need of checking their work. (MtP-6B)

Furthermore, another teacher stated:

It is wastage of time to check LWVI's work. This is because when checking I only see dots which I don't understand the meaning (MtP-7).

Furthermore the data obtained through observation showed that teachers have no time to check learners' work written in Braille due to overcrowded classes that do not allow teachers to move around.

The findings show that majority of teachers who teach mathematics in an inclusive class do not have special training in the field of Special Needs Education, so they have insufficient skills in teaching mathematics to LWVI.

#### **4.2. Methods used by teachers' when teaching mathematics to learners with visual impairment.**

The investigator wanted to know if learners with visual impairments were actively involved in lesson activities. The findings obtained through the interview revealed that there was no involvement of learners with visual impairment in the lessons. The respondents interviewed majority (6) said they don't involve them, but they just listen to what the teacher is teaching.

One of the respondents said:

It is hard to involve learners with visual impairment in the mathematics lesson. For example when teaching addition it is hard to involve them since they are not seeing numbers written on the chalkboard to be added. (MtP-3)

Another respondent said

When am asking questions in the class it means everybody is included whether rise up hand or not, because he/she has heard, and their duty is to answer the question (MtP-6B)

However, MtP-7 involved all learners including LWVI in the mathematics lesson; this was done by asking them to answer the questions by calling their names one by one. She argued:

I involve LWVI in mathematics lesson by mention their names one by one, but if you wait them to rise up their hands they will not.

Observation technique also revealed that most of the learners with visual impairment were left out without being involved in answering questions like their fellow sighted learners during the lesson. There was no much interaction with mathematics subject because of the hardness they find when learning such subject. They end up not understanding what they have been taught.

The Provision of Braille mathematics books to guide learners with visual impairment to do assignment was investigated. The investigator was also interested in knowing if there is provision of Braille mathematics books to guide learners with visual impairment when doing assignment. The findings show that all respondents (8) said there were no brailed mathematics books that could guide learners with visual impairment to do assignment/ work. All books are written in print which learners with visual impairment cannot be able to read so they depend on sighted fellow learners to read for them.

One respondent narrated that:

I have never seen mathematics Braille book since I started teaching in this school. Learners with visual impairment use printed books and sighted learners are the ones to read for them to write the assignment assigned to them. (MtP-7)

Furthermore, the investigator during observation discovered that learners with visual impairment have no brailed mathematics books, so it was hard for them to do and finish their assignment on time.

Respondents were asked about provision of tactile materials to learners with visual impairment during learning mathematics. The respondents (8) said that there were no tactile materials presented when teaching mathematics to learners with visual impairment. For example in geometry, teachers would just explain how the shape of the diagram looks like. MtP-5 pointed out that there were no resources for making tactile materials to help LWVI to understand when learning mathematics lesson for some of shapes especially in geometry topic. “Also most of us teachers who are not trained in the field of special needs education is a problem to prepare tactile materials for LWVI to use.

There is no drawing mat, tracing wheel, which can help teachers to prepare tactile materials to assist learners understand better during mathematics lesson (MtP-5B)

Another respondent reported that:

I don't have teaching materials; I just use ordinary materials just like the ones used by ordinary learners. I do not have specifically that material meant for the blind and it is because I don't know how to use Braille and write Braille. (MtP-6)

The observation which was done in class 6 also revealed the same problems of tactile materials in the class. During the observation of geometry lesson in class 6, it was hard for learners with visual impairment to do geometry work since they had no tactile materials to make them understand shapes. So learners with VI were just there listening. By the end of the lesson, the teacher just explained to learners with VI how the shapes looked like in order to get a mental picture of some shapes.

In case of the methods used to teach mathematics to learners with visual impairment in an inclusive class, the investigator wanted to know the methods used to teach mathematics to learners with visual impairment in an inclusive class. The finding obtained through the interview revealed that there were no participatory methods but non-participatory methods were used to teach

LWVI in an inclusive class. Majority of the respondents (7) were using non participatory methods when teaching in an inclusive class while only (1) used participatory methods

One of respondent said

Am using expository method (lecture methods) to teach mathematics to NVIL and LWVI because they hear and they are able to follow what am teaching easily (MtP-6B)

Another respondent argued that:

When teaching using participatory methods like discussion, debate etc., these methods take a lot of time and it is not easy to finish what one has planned to teach for 40 minutes which is the allotted time for a lesson. (MtP-7)

Two respondents claimed that:

Using participatory methods takes time and it is hard especially in the big class like mine which has 100 learners and above including learners with visual impairment. (MtP-3B and MtP-6)

The investigator observed that majority of teachers she observed use non participatory methods when teaching mathematics in an inclusive class. The investigator observed that teachers teach mathematics in class three (3) without considering the needs of learners with visual impairment who are in the class. The teacher used teacher-centered methods (talk and chalk) whereby LWVI were just listening.

The findings concerning the methods teachers employ when teaching LWVI in an inclusive classes reveal that most teachers used lecture methods to teach mathematics subject. Furthermore, findings show that most teachers do not use learning materials when teaching something that causes LWVI not to understand the concepts for example in geometry.

### **4.3 Challenges teachers' face when teaching mathematics to learners with visual impairment.**

Regarding the teachers' explanation of concepts to learners with visual impairment the results showed that majority of respondent (7) out of (8) reported that they do explain concepts to LWVI but there is challenge to explain some concepts because they have no idea of what the teacher is explaining. This is due to lack of mental picture of such things. For example, it is hard to make the LWVI to understand the concept of decimal, geometry and so on. Findings further revealed that other explanations teachers made, made learners with visual impairment to be confused. It was reported that most of them get out of the class when mathematics lesson is on progress.

However, the same scenario was noted by the investigator during observation, those teachers use ordinary teaching and learning materials to explain concepts without giving LWVI to explore the material. They just listened to the teachers and failed to understand because some concepts need learning materials in order to understand them better.

Assistance of the teacher to the learners with visual impairment in and outside the class was found to be a challenge. The findings showed that it was hard for LWVI to access teachers help when in or outside the class whenever they needed help. After classes teachers cannot give remedial to LWVI where they did not understand. One respondent argued that:

I have no time to help learners with VI who didn't understand my lesson; their fellow sighted learners can help them better than me. (MtP-4)

Another one said:

I have a lot of lessons to teach per day. It is hard for me to assist LWVI after classes because I will be tired and I need to rest. Sighted learners can help them on my behalf (MtP-6B).

However MtP-5B and MtP-3B respondent said they do assist LWVI in and outside class.

During break time, I call one by one and help where they find difficulties, and when there no teacher in the class I call them and assist them. I do so because after classes I will be tired, and I need much time to rest and to do homework at home. (MtP-3B)

Furthermore, the same scenario was noted by the investigator during observation, that teachers had no time with learners with visual impairment. Since they indicated that they were not trained in the field of Special Needs Education, they just taught them like ordinary learners and when LWVI needed help, it was hard for the teacher to help even outside the class

However, the lack of cooperation between ordinary teachers and trained teachers was found to be a big challenge. Ordinary teachers failed to get assistance from trained teachers in terms of translating learners' work from Braille to print to be able to mark them properly, and also to assist them in preparing tactile teaching and learning materials using materials from the surrounding environment. This made teachers to exclude learners with visual impairment when teaching mathematic in an inclusive class.

The findings obtained revealed that teachers have little knowledge about inclusive education although they are teaching in inclusive classes. Another finding is that majority of teachers who are teaching in inclusive classes are untrained in the field of Special Needs Education and use trial and error methods when teaching mathematics subject.

However, findings also discovered that there were overcrowded classes due to high enrollment of learners. The classes are packed, teachers cannot be able to move around and check learners work. Lastly teachers have many subjects to teach per day. This is a challenge to them because they do not spare time to help LWVI after class hours.

## **CHAPTER FIVE**

### **DISCUSSION CONCLUSIONS AND RECOMMENDATIONS**

#### **5.0 Introduction**

This chapter presents the summary of findings that emphasized information in terms of the objectives which were to examine teachers' knowledge and skills in teaching mathematics to learners with visual impairment, identify methods used by teachers when teaching Mathematics to learners with visual impairment, and to find out challenges faced by teachers when teaching mathematics to learners with visual impairment. It further discussed the results, made conclusions about the findings and general recommendations for further researchers.

#### **5.1 Discussion of findings**

##### **5.1.1 Teachers Knowledge and skills in teaching Braille mathematics to learners with visual impairment**

Findings from the current study shows that majority of the teachers teaching mathematics in an inclusive school are not special needs education teachers but they are ordinary teachers with insufficient knowledge and skills of Special Needs and Inclusive Education at large and specifically in area of Braille mathematics among teachers' is lacking. This argument is strengthened by the study conducted in Turkey by Kesiktas and Akcamete (2011) whose findings showed that, there was insufficient knowledge and skills among Turkish teachers regarding implementation of inclusive teaching for students with visual impairment. The findings revealed that most teachers are not Special Needs Education teachers and so, they often have to use the "trial and error" method to find out the best way of teaching their blind students who are included among sighted students. Another study done in South Africa in by Maguvhe (2014) to explore teaching science and mathematics to students with visual impairments the findings revealed that teachers lacked



special training to teach blind learners, and no rigorous supervision during their teaching practices. Due to that fact, they were not competent in transferring their knowledge to learners with special learning needs, particularly the blind.

More so, the study by Maguvhe (2015) in South Africa discovered the same that teachers were not well trained to teach the blind learners in an inclusive setting. That was the reason why they teach as if all learners are sighted.

### **5.1.2 Methods teachers' used when teaching mathematics to learners with visual impairment**

Findings from the current study concerning the methods teachers employ when teaching mathematics in an inclusive class, revealed that majority employ talk and chalk when teaching without considering the needs of all learners. Furthermore, teachers said that they use lecture method very often because of large classes in which application of participatory methods is difficult. The above findings were similar to those of Kayombo (2010) studied teachers' competency in handling learners with disabilities in inclusive primary schools in Tanzania. The findings showed that methods employed by teachers in inclusive classrooms were inappropriate. For instance, question and answer, and lecture method were the most teaching and learning methods used by the teachers. Kayombo concluded that these methods cannot make LWVI to benefit from the lesson instead they end up hating mathematics.

It is true that this situation may threaten the use of participatory methods, and therefore affecting the quality of teaching in these schools. The end product might be poor performance in mathematics subject.

The issue of instructional materials was investigated and the findings were that teachers were not using teaching materials because they are not available especially for LWVI due to lack of

enough funds in the inclusive school. Apart from lack of these teaching materials, teachers lack the knowledge and skills of adapting these teaching materials to become relevant to the needs of learners with visual impairments. The study done in Uganda by ICEVI (2005) found out that in order for children with visual impairment to be successful in mathematics, there was need for the availability of specialist teachers, Braille learning materials and availability of tactile equipment that suit the needs of all learners. In line with the above argument, Simon (2010) conducted a study in Spain on analyzing the process of inclusion of students with visual impairments. The study found out that schools do not have appropriate teaching and learning resources to help students with visual impairments learn better in inclusive classrooms. Also Kilulu (2010) did a study on the challenges facing teachers and pupils in Inclusive Primary Schools in Tanzania; the findings revealed that majority of inclusive schools had no visual and learning materials,

Furthermore the study by Moodley (2012) found out that in order for the learners to be active participants in the teaching and learning process, institutions must ensure that teaching and learning materials are used as well as made available to all the learners with visual impairment according to their needs. Furthermore, Lewis & Little (2007) conducted a study with an intention of providing insight on the current situation of inclusive education in four countries, namely Nepal, Tanzania, Vietnam and Zambia. The findings of the study in Tanzania revealed that teachers are not educated enough in the use of Braille materials, tactile diagrams and maps etc. to be able to face the challenges of inclusive teaching.

Likewise, Zulch, (2010) conducted a study in Namibia to explore and describe how the learners with visual impairment are included in a Namibian mainstream school. The study revealed that there was lack of teaching materials to support the learners with visual impairment. This showed that learners with visual impairment were only included physically and not education wise.

### **5.1.3 Challenges teachers' face when teaching learners with visual impairment**

The issue of untrained teachers was investigated and the findings showed that majority of teachers who are teaching mathematics in inclusive classes are untrained. A study conducted in South Africa by Maguvhe, (2014) indicated that teachers lack special training to be able to teach learners who were blind thus they are not competent enough to transfer their knowledge to learners with special learning needs, particularly to learners who were blind.

Another study done in Zambia by Simalalo (2006) showed that most teachers were incompetent to teach LWVI and hence some of them did not know mathematics signs in Braille hence leading to poor teaching.

The current study found that there was little knowledge about inclusive education among ordinary teachers. A study conducted by Mwakyeja, (2013) revealed that there was little knowledge about inclusive education among ordinary teachers. Findings further showed that the general teachers were not using the little knowledge they had on teaching inclusive classrooms due to challenges like lack of commitment among them, lack of the resources and so on. The also findings revealed that the rate of enrolment in primary schools has exceeded teacher student ratio, which has resulted into crowded classrooms and students with disabilities lack support needed in the classroom.

The study done by Polat & Kisanji (2009) revealed that many inclusive classrooms in Tanzania have large number of students with an average of 80 to 120 students per class. This situation may threaten the use of participatory methods, and therefore affecting the quality of teaching in these schools. Another study done by Krohn-Nydal (2008) on development of inclusive education in Tanzania revealed that there are very few qualified teachers, and large number of students in classroom. This caused teachers not to be able to attend to all learners in the class.

Similarly, Kilulu (2010) did a study on the challenges facing teachers and pupils in Inclusive Primary Schools in Tanzania. The findings revealed that 90% of the inclusive classrooms were small and overcrowded with more than 65 learners in one class. This was hard for one teacher to be able to teach and accommodate LWVI in the big class like that.

On the other hand, Najjingo (2009) conducted a study about the challenges of accessing all inclusive education services by children with disabilities in Uganda. The findings showed that there is overcrowded classrooms, (ratio: learners-teachers: 100:1), this is a challenge to teachers who are teaching mathematics to LWVI in an inclusive class. Also it is a challenge to LWVI as they do not get any assistance and therefore fail to understand the mathematics concepts.

Another finding is about high workload to the teachers in an inclusive school. The findings revealed that teachers had many lessons to teach per day. Thus the teachers failed to give remedial work to learners with visual impairment after class hours. The study on learning achievement of pupils with disabilities in inclusive primary schools in Tanzania by Senkondo (2010) found out that there were overcrowded classrooms, and large number of periods per teachers which causes teachers not to have time to help LWVI where they did not understand while in the class.

## **5.2 Conclusions**

In line with the study objectives, findings and the discussion of the results, it is hereby concluded that:

There is insufficient number of skilled teachers teaching mathematics in inclusive schools and majority of ordinary teachers have no knowledge and skills of teaching mathematics to learners LWVI in an inclusive school.

Teachers use non participatory methods when teaching mathematics to LWVI in inclusive schools.

The teachers use teaching learning materials which are not appropriate to teach mathematics to LWVI in inclusive schools.

Teachers do not have knowledge about inclusive education something that affects the way they instruct LWVI in inclusive schools.

Knowledge of inclusive education was investigated and the findings revealed that teachers' have little knowledge about inclusive education. This therefore affects the process of teaching and learning process to LWVI in inclusive classrooms.

The findings found that majority of teachers who are teaching mathematics in inclusive classes are untrained in the field of special needs and it is hard for them to transfer knowledge to the learners. This affects the learning of learners with visual impairment.

The findings further showed that teachers use non-participatory methods (talk and chalk) when teaching mathematics in an inclusive class where LWVI are placed. Also participatory methods needs time when using it, but 40 minutes of one lesson cannot be enough and teachers' want to finish their syllabus. So the only option is to use non-participatory methods.

Furthermore Teaching materials for LWVI were also found to be lacking. Ordinary teacher goes to teach having ordinary teaching material which cannot help LWVI understand mathematics lesson. The findings shows that teachers' cannot make materials that suit the needs of LWVI so they prefer to explain the concept to LWVI while ordinary learners are accommodated.

However, findings also revealed that there are overcrowded classes due to high enrolment. This made teachers not to have time for LWVI and even to prepare their assignment written in braille form.

Finally Findings revealed that teachers' have many lesson to teach per day which is a challenge to them. So they end up excluding LWVI in an inclusive class.

## **5.2 Recommendations**

The following recommendations are made for the improvements based on findings:

It was found from teachers that, there are majority who are untrained and few trained teachers who have enough knowledge on how to teach LWVI in an inclusive school. This has been a major challenge to the implementation of inclusive education in Tanzania. The Government, under the Ministry of Education Science and Technology (MOEST) should organize regular workshops, seminars and refresher courses for ordinary teachers who are teaching mathematics in inclusive schools. These trainings will help teachers to become creative when preparing teaching and learning materials for the learners with Visual Impairment, and also it will help teachers' to learn things which they don't know in mathematics subject and be updated in current issues about Braille mathematics. Also workshops will help teachers' to understand difficult concepts such as measurement and geometry and effective use of instructional materials when teaching difficult mathematical topics to LWVI.

Teachers who have Braille knowledge should be updated by attending seminars and workshops to sharpen their knowledge. Also they should educate teachers on how to make inclusive classrooms to all learners include LWVI.

The government should provide enough teaching and learning resources to these inclusive schools and particularly for students with visual impairments. Things like models, talking books, printers and tactile materials etc, should be made available. Also the Government in collaboration with well-wishers should provide devices like Perkins Brailers to improve teaching and learning of LWVI in inclusive classrooms.

The government under the ministry of education science and technology (MOEST) should organize workshops and seminars to update teachers on participatory methods used when teaching in inclusive classes.

However, the government under the Ministry of Education Science and Technology (MOEST) should increase subvention grant to schools so that they are able to purchase materials needed when preparing instructional materials that suit the needs of all learners including LWVI in an inclusive class. Also special workshops are needed to train teachers' on how to make tactile materials.

Lastly the government should employ more mathematics teachers' in order to reduce workload to the teachers and made them to have little lesson per day.

### **5.9 Recommendations for Further Study**

A study with a larger sample should be carried out on the teaching and learning of mathematics for LWVI in inclusive primary schools. Such a study would provide a wider picture of education issues on all learners placed in an inclusive setting.

A similar study should be extended to another subject like science and see how teachers teach science subject to LWVI in an inclusive school. Such a study would show if teachers are able to teach learners with visual impairment using materials that cater for all learners including those with visual impairment.

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**APPENDIX I:**

**REQUEST LETTER FROM THE RESEARCHER**

DELPHINA KEZILAHABI,  
IGOMA PRIMARY SCHOOL,  
S.L.P 10229,  
MWANZA .  
03/03/20

THE HEAD TEACHER  
MITINDO PRIMARY SCHOOL  
S.L.P  
MISUNGWI – MWANZA

Dear sir/Madam,

**RE: PERMISSION TO CONDUCT A RESEARCH STUDY IN YOUR SCHOOL**

Reference is made above

I'm a student at Kyambogo University in Uganda with registration number 17/X/14809/GMSN/PE pursuing Master's degree in Special Needs Education. I hereby request for permission to conduct a study in your school for a period of 1 month in March 2019.

The title of the study is: *Teacher's experiences in teaching mathematics to learners with visual impairment in Mitindo inclusive primary school in Tanzania*. I have decided to involve your school in this study because it is the only school which offers inclusive education in Misungwi District and is the school where I can get detailed information about my study.

During my field work I would like to work with 8 Mathematics Teachers teaching pupils with Visual Impairment.

I hope that my request will be considered.

Yours faithfully,

Kezilahabi Delphina

+255754 264 402

**APPENDIX II:**

**PERMISSION LETTER FROM MISUNGWI DISTRICT COUNCIL**

**THE UNITED REPUBLIC OF TANZANIA  
THE PRIME MINISTER'S OFFICE**

**ORIGINAL ADMINISTRATION AND LOCAL GOVERNMENT  
MISUNGWI DISTRICT COUNCIL**



Phone: 255-732980745  
Fax: 255 732980745  
E-mail: dedmisungwi@gmail.com

S.L.P 20,  
MISUNGWI.

Ref No: MZA/MDC/E.10/36/83

08.03.2019

**RE: RESEARCH PERMIT FOR MS DELPHINA KEZILAHABI**

The above name is a Student of Kyambogo University (Uganda). She has been permitted to undertake field work research on *teacher's experiences in teaching mathematics to learners with visual impairment in an inclusive primary school in Tanzania* from March 2019.

I kindly request your cooperation to enable accomplishment of her research.

A handwritten signature in blue ink, appearing to read "Frank Magabilo".

Frank Magabilo

**DISTRICT EDUCATION OFFICER  
MISUNGWI**





## **APPENDIX III:**

### **INTERVIEW GUIDE FOR TEACHERS**

#### **SECTION A: Bio data**

Gender: .....

#### **SECTION B: Knowledge of braille mathematics to learners with visual impairment**

1. How would you rate your own level of knowledge of Kiswahili braille?
2. How does the teacher use braille to set assignment
3. Do the teachers check learners mathematics work written in braille?

#### **SECTION C: Methods used when teaching learners with visual impairment**

4. Are the learners active involved in the lesson activities?
5. Is there provision of braille mathematics books to learners with visual impairment?
6. Do teachers provide tactile materials to learners with visual impairment to explore?
7. Which teaching methods do teacher use to teach mathematics subject to learners with visual impairment

#### **SECTION D: Challenges teachers face when teaching mathematics to learners with visual impairment?**

8. Does teachers explain hard concept learners with visual impairment? how
9. Does teachers assist learners with visual impairment in and outside class? how

**THANK YOU FOR YOUR SUPPORT**

**APPENDIX IV:**

**OBSERVATION GUIDE FOR MATHEMATICS TEACHER**

Class taught..... Topic.....

Number of LWVI ..... Number of NVIL..... Time.....Duration.....

<b>Aspects of teaching</b>	<b>Teachers activity</b>	<b>Learners activity</b>
<p>Teachers level of knowledge of braille mathematics when teaching mathematics to learners with visual impairment</p> <ol style="list-style-type: none"> <li>1. Teachers knowledge of mathematics braille</li> <li>2. Teacher use of braille to set assignment for learners with visual impairment</li> <li>3. Checking learners work written in braille</li> </ol>		
<p><b>Methods used by teachers when teaching mathematics to learners with visual impairment</b></p> <ol style="list-style-type: none"> <li>4. Learners active involvement in lesson activities</li> <li>5. Provision of braille mathematics work to guide learners with visual impairment</li> <li>6. Teaching methods used to teach mathematics subjects to learners with visual impairment</li> <li>7. Provision of tactile material to learners with visual impairment to explore.</li> </ol>		
<p><b>Challenges teachers face when teaching mathematics to learners with visual impairment</b></p> <ol style="list-style-type: none"> <li>8. Challenges faced when teaching mathematics subject in an inclusive class</li> <li>9. Teachers explanation of hard concept to learners with visual impairment</li> </ol>		

10. Teacher's assistance to the learners with visual impairment in the classroom.		
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THE END

APPENDIX V:

MAP OF MWANZA REGION SHOWING DISTRICTS AND AREA OF STUDY

