ACQUISITION OF INFORMATION AND COMMUNICATION TECHNOLOGY SKILLS AMONG LEARNERS WITH VISUAL IMPAIRMENTS: ANALYSIS OF THE SELECTED SCHOOLS IN SOUTHERN AND LUSAKA PROVINCES

By

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A dissertation submitted to the University of Zambia in partial fulfilment of the requirement for the award of the Master of Education in Special Education

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DECLARATION

I, **Musonda Mkumpa**, declare that the content of this dissertation is my original work, certify that any material previously published or written by another person is duly acknowledged, and that, this dissertation has never been submitted at the University of Zambia or any other institution of higher learning for the award of any academic qualification.

Signature…….

Date……..

CERTIFICATE OF APPROVAL

This dissertation of **Musonda Mkumpa** has been approved as a partial fulfilment of the requirements for the award of the Degree of Master of Education in Special Education by the University of Zambia.

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ABSTRACT

In the modern era, Information and Communication Technology (ICT) plays a critical role in everyday life, with over 5.16 billion global internet users. In Zambia, ICT usage has grown significantly, particularly through mobile internet access, with 85% of the population able to use 3G or 4G services. Despite this progress, the education system particularly for learners with visual impairments faces considerable challenges in integrating ICT into teaching and learning.

This study employed a qualitative collective case study approach to explore the acquisition of ICT skills among learners with visual impairments in four selected secondary schools located in Lusaka and Southern Provinces: Munali Boys, Munali Girls, Rusangu Secondary, and St. Mulumba Special School. A total of 20 participants were purposively selected, comprising 8 focus groups with visually impaired learners and 12 individual interviews with teachers and resource personnel. The learners, drawn from grades 10 to 12, included both males and females from varied low- to middle-income backgrounds. Data collection methods included semi-structured interviews and focus group discussions, supported by thematic analysis.

Findings revealed substantial disparities in the availability of ICT resources across schools. St. Mulumba Special School was better equipped with assistive technologies such as JAWS screen reader software, braille embossers, and trained support staff, enhancing the ICT learning experience. Conversely, Munali Boys, Munali Girls, and Rusangu Secondary faced critical shortages of assistive devices and ICT-trained educators, significantly limiting the learners' capacity to acquire ICT skills. Additionally, most teachers lacked formal training in inclusive ICT instruction, further hindering effective learning for students with visual impairments.

The study highlights the urgent need for targeted investments in assistive technologies, teacher capacity-building, and inclusive ICT infrastructure. Bridging these gaps is essential to ensuring equitable access to digital education for visually impaired learners. These insights offer valuable guidance for policymakers, educators, and development partners committed to promoting inclusive education in Zambia's digital era.

Key words: Learners, Visual Impairment and Information Communication Technology.

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DEDICATION

I would like to dedicate this dissertation to my father Musonda E and my mother Musonda W.T. for the support rendered in this academic journey. I also dedicate this dissertation to my siblings, Naomy, Simon, Chimfwembe and Lawrence Musonda for their moral support and encouragement for me to remain afloat.

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ACRONYMS AND ABBREVIATIONS

AT	Assistive Technology
CCTV	Closed Circuit Television
CDC	Curriculum Development Centre
CFT	Cognitive Flexibility Theory
FGD	Focus Group Discussion
ICT	Information and Communication and Technology
JAWS	Job Access with Speech
LVI	Learners with Visual Impairment
UNESCO	United Nations Education Science and Cultural Organisation
ZICTA	Zambia Information and Communications Technology Authority
ZPD	Zone of Proximal Development

CHAPTER ONE

INTRODUCTION

1.0 Introduction

This chapter presents the background on the acquisition of ICT skills among learners with visual impairment globally, in Africa and Zambia. It highlights pertinent information that gives a clear picture of the subject, and contextualizes the importance of ICT among the visually impaired learners in the education systems. It also gives a detailed account of the problem statement, objectives of the study, research questions, significance of the study, theoretical framework, delimitation and limitations of the study.

1.1 Background of the study

In modern society, ICT has taken a central role in people's lives, with over five billion individuals globally now connected to the Internet. This rapid digital transformation has made ICT essential for daily tasks ranging from academic to professional to routine household activities. By the end of 2019, the global internet penetration rate reached 63.4%, and by 2023, 92.6% of internet users were accessing the web via mobile devices (Digital Global Overview Report, 2023). ICT encompasses all technologies used to communicate, create, access, and manage information, including computer hardware and software, the Internet, and audio-visual tools (UNESCO, 2021).

However, while global internet usage continues to rise, individuals with disabilities, including those with visual impairment, remain significantly underserved. According to the International Telecommunication Union (ITU), persons with disabilities are nearly 30% less likely to use the internet compared to those without disabilities. This digital divide is even more pronounced among individuals with visual impairment, many of whom face multiple barriers, such as lack of assistive technologies (ATs) and inadequate digital literacy.

Across Africa, internet usage has experienced exponential growth. The number of users increased from 181 million in 2014 to approximately 646 million by January 2024, and it is projected to reach 1.1 billion by 2029 (Statista, 2024). This growth reflects increased investment in mobile technology, broadband infrastructure, and digital transformation initiatives across the continent. The affordability of smartphones and expanding mobile network coverage have significantly contributed to the rise in digital access. Several African

countries, such as Kenya, Nigeria, South Africa, and Ghana, have implemented national digital strategies aimed at integrating ICT into education and other key sectors. While this progress is commendable, it does not reflect the reality for all, especially for persons with disabilities, who continue to be marginalized in the digital space.

Despite the increase in internet access, individuals with disabilities represent only a small fraction of total users. According to the World Bank (2021), persons with disabilities are about 50 percent less likely to use the internet compared to those without disabilities. The situation is even more challenging for learners with visual impairment who face multiple barriers, including limited availability of assistive technologies such as screen readers, Braille displays, and audio-based learning platforms. Additionally, the digital content available online is often not designed using inclusive principles, making it difficult or impossible for learners with visual impairment to interact with these resources meaningfully. UNESCO (2020) notes that the lack of accessibility standards in educational content continues to limit the participation of visually impaired learners in both formal and informal learning environments.

In addition to infrastructure challenges, limited digital skills further hinder the inclusion of learners with visual impairment. Many schools in Africa, especially those in rural areas, lack the necessary equipment and trained personnel to support ICT learning for students with disabilities. Mtega et al. (2022) found that only a small number of institutions in sub-Saharan Africa are equipped to deliver specialized ICT training for learners with visual impairment. Even in urban centers where resources are more available, access remains restricted due to high costs and limited awareness. As a result, learners with visual impairment are often left behind in digital education initiatives, limiting their chances of academic success and future employment in a technology-driven world. Addressing these disparities requires deliberate efforts in policy-making, funding, and inclusive curriculum development that prioritize digital equity for all learners.

In Zambia, the ICT sector is expanding, with the Zambia Information and Communications Technology Authority (ZICTA) reporting an 18% year-on-year growth in the mobile phone subsector (ZICTA, 2022). As of 2023, mobile subscriptions increased from 1.7 million in 2006 to 20.2 million. Despite over 90% of the population having network coverage, only 25.2% of individuals aged 10 years and older reported having used the internet, and a mere 11.5% had the ability to use a desktop computer (ZICTA, 2022). Among individuals with disabilities, particularly those with visual impairment, access to ICT tools and skills remains even lower,

largely due to lack of appropriate ATs, limited inclusion in national digital policies, and infrastructural constraints.

To address this gap, the Zambian government has implemented reforms such as mainstreaming ICT into the education curriculum and introducing it as a compulsory subject. Addtionally, the government has introduced National ICT policy, 2023 to ensure that learners acqure necessary skills in ICT. However, challenges persist, especially at the Early Childhood and Primary Education levels where implementation is weak due to inadequate resources. Compounding this is the low institutional capacity to train teachers in inclusive digital pedagogies and the lack of connectivity and assistive devices for learners with disabilities.

ICT holds transformative potential in education for learners with visual impairment. Digital tools such as screen readers, Braille translation software, and adaptive mobile apps enable more inclusive and effective learning. Studies by Mpolomoka et al. (2022) and Lucky & Achebe (2012) emphasize that tools like the Kurzweil Reading Machine, Braille embossers, and CCTV are instrumental in providing accessible learning environments. Yet, the lack of consistent integration of these technologies continues to exclude many visually impaired learners from the full benefits of digital education.

1.2 Statement of the Problem

Despite the growing need for use of technology to enhance the learning experience of learners with visual impairments, challenges remain which hinder their effective learning. Some of the challenges include low ICT skills among teachers which make it hard to deliver information to learners with visual impairment. Further, inadequate resources in many schools makes it hard for teachers and learners themselves to use ICT which hinder effective learning experience of learners with visual impairments (Keitany, et al. 2023). Additionally, time allocated to learning ICT among learners with visual impairments is another hindrance to the acquisition of these skills (ibid).

ICT has been recognised in zambia and the wolrd at large to mention that the global catalyst for social-economic development for any country (National ICT policy, 2023). However, it is still unclear how embraced ICT is for the education for learners with special needs.

Zambia is faced with a similar problem to a limited infrastructure to support ICT education, and teachers on how to use ICT for learning for students with visual impairments with limited knowledge, that shows understanding and support for the technical integration of visual impairments (Mtonga, 2013). With increased technology, it is expected to have investment in ICT systems to help learners with disabilities acquire ICT skills which can ease their access to learning materials. However, the situation on the ground is different as many learners with disabilities face a challenge in acquiring ICT skills due to lack of access to ICT materials for learning.

1.3. Purpose of the study

The purpose of this study was to establish the acquisition of ICT skills among learners with visual impairment in selected special schools of Southern and Lusaka provinces.

1.4 Research Objectives

1.4.1 Objectives of the study

i. To explore ways learners with visual impairment, learn ICT in selected secondary special schools in Lusaka and Sothern Provinces;
ii. Determine strategies used to teach ICT skills to learners with visual impairment in selected secondary special schools in Southern and Lusaka province; and,

iii. To evaluate the challenges facing visually impaired learners in acquisition of ICT skills in selected secondary special schools in Southern and Lusaka province.

1.4.2 Research questions

i. How do learners with visual impairment learn ICT in selected secondary special schools in Lusaka and Sothern Provinces?
ii. What strategies are used to teach ICT skills to learners with visual impairment in selected secondary special schools in Southern and Lusaka province?
iii. What are the challenges facing visually impaired learners in acquisition of ICT skills in selected secondary special schools in Southern and Lusaka province?

1.5 Significance of the Study

The study may contribute to the understanding of the acquisition of ICT skills among learners with visual impairments. By understanding how these learners acquire ICT skills, policy makers can identify the gaps and barriers in the current educational system. This information is crucial for developing strategies that improve the integration of technology in special education, particularly during disruptions like disease outbreaks. The study's findings may inform the development of better educational programs, enhance teacher training, and lead to the improvement of infrastructure to support ICT learning. These improvements can significantly enhance the learning experience for visually impaired students, to ensure that they are not side lined in the education system.

1.6 Theoretical Framework

The research is grounded on Cognitive Flexibility Theory (CFT) developed by Psychologists Spensley and Taylor in 1999. Cognitive Flexibility Theory (CFT) suggests that, deep learning requires learners to engage with new content from multiple perspectives and in flexible ways of thinking. Research on CFT informed learning environments suggests that flexible thinking during learning activities supports the development of higher order thinking skills and prompts positive changes in the learner’s affective domain. Thus, incorporating CFT principles into learning resources should prompt learners to engage deeply with instructional content (Spensley and Taylor, 1999).

Further, the Cognitive Flexibility Theory is an important cognitive process that empowers individuals to adapt to dynamic situations by shifting their thinking patterns and problem-

solving strategies. It encompasses the ability to switch between diverse mental sets, contemplate multiple perspectives, and generate creative solutions (Kisanga et al, 2020).

In the context of ICT skill acquisition, cognitive flexibility holds particular significance for learners with visual impairments. These learners often encounter unique challenges, such as navigating complex software interfaces, adapting to emerging technologies, and overcoming accessibility barriers. Therefore, cognitive flexibility plays a crucial role in ICT skill acquisition for visually impaired learners. Firstly, it helps them adapt to the rapid pace of technological advancement which necessitates continuous learning and adaptation. Cognitive flexibility enables learners to embrace new software, hardware, and assistive technologies as they emerge. Further, visually impaired learners may encounter technical difficulties, such as software glitches, hardware malfunctions, or accessibility issues. Hence, cognitive flexibility empowers them to identify problems, consider multiple solutions, and implement effective strategies to resolve them.

Furthermore, assistive technologies, such as screen readers, braille displays, and speech recognition software, significantly enhance the ICT skills of visually impaired learners. However, cognitive flexibility is essential for mastering these tools and customizing them to individual needs. Additionally, cognitive flexibility fosters the development of metacognitive skills, enabling learners to monitor their learning progress, identify strengths and weaknesses, and adjust their learning strategies accordingly.

Therefore, understanding the role of cognitive flexibility in ICT skill acquisition, it can help develop targeted interventions to enhance the learning experiences of visually impaired learners. These can include designing instructional materials and activities that promote cognitive flexibility and problem-solving skills, providing explicit instruction on metacognitive strategies such as self-monitoring, self-evaluation, and self-regulation, fostering collaborative learning environments where learners can share experiences, solve problems together and learn from each other and ensuring that learners have access to a variety of assistive technologies and opportunities to experiment with different tools and techniques. These will then empower visually impaired learners to fully harness the potential of ICT.

1.7 Delimitation of the study

Delimitations explain the boundaries the researcher imposes prior to initiating a study and is important to narrow the focus of a study (Creswell and Poth, 2016). The main research

delimitations were; the study only explored the academic experiences of LVI, and the study was conducted in four purposely selected special and inclusive secondary schools in Lusaka and southern provinces in Zambia.

1.8 Limitations of the study

The study was conducted in four secondary schools in Zambia; hence the results cannot be generalized to other settings. Despite its non-generalization in other wider settings, the study findings can however be generalized in the four school settings and serve as a precursor in understanding the academic experiences and support needs of LVI. Furthermore, the use of a single research design may have limited the investigation of ICT skill acquisition among LVI. To avert these limitations, immediately after each interview, the researcher made sure that data derived from each participant was thoroughly counter checked for any inconsistencies. The researcher also sought further clarifications from participants through the use of mobile phone calls. The use of different data collection strategies in the study that included interviews schedules and FGDs provided some form of triangulation which augmented the study findings.

1.9 Operational definition of key terms

Acquisition of Information and Communication Technology (ICT) skills -Involves gaining proficiency in using digital tools, software applications, and devices to effectively navigate, create, communicate, and solve problem in a technology-driven environment.

Visual Impairment- Refers to a condition where individuals experience significant limitations in seeing or interpreting visual information, either with no functional vision (blindness) or with residual vision (partial blindness).

Inclusive School- Refers to an n institution that effectively accommodates and supports the diverse needs of all students, including those with disabilities or special educational requirements.

Special School- It is an educational institution designed to cater specifically to students with disabilities or special educational needs.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter presents reviewed literature related to the topic of the acquisition of ICT skills among learners with visual impairment. It provides the review of literature related to the subject of the acquisition of ICT skills among learners with visual impairment and these are grouped grouped according to key themes they address.

2.1 How Learners with Visual Impairment Learn ICT

The study by Simui et al., (2017), focused on exploring the role of Information Communication Technologies (ICTs) in enabling the academic success of Students with Visual Impairments (SwVI) at Sim University. This was guided by a Hermeneutic Phenomenology approach. Seven participants shared their lived experiences, revealing a cluster of themes related to ICT usage. The study highlighted self-initiated ICT tools used by students with visual impairment including ordinary typewriters, voice recorders, scanners, JAWS, and computers to enhance their learning experiences. Furthermore, the study highlighted the success story of a visually impaired student, who used a typewriter as a solution to facilitate communication between a braille expert student and ordinary lecturers.

Keitany et al. (2020) investigated the factors influencing access to Information Communication Technology (ICT) for learners with visual impairment (VI) in special primary schools in Kenya, revealing critical insights into how technology supports inclusive learning. Their study, which utilized a descriptive survey design, involved 75 learners selected through a mix of purposive, stratified, and simple random sampling from three counties Kiambu, Meru, and Mombasa. The methodology emphasized the importance of varied sampling strategies to ensure representation across geographic and institutional contexts. The study found that personal computers significantly enhanced concentration among learners with VI, allowing them to absorb information more effectively through incidental learning where knowledge is gained through everyday digital interactions rather than formal instruction (Keitany et al., 2020). This highlights the value of digital tools in creating engaging and autonomous learning environments for students with disabilities.

Moreover, the findings highlight that learners with VI expressed overwhelming support for the integration of ICT into their education. This enthusiasm reflects the recognition among learners of the pivotal role that technology plays in leveling the educational playing field, particularly by granting them independence in accessing information and completing tasks (Keitany et al., 2020). This aligns with broader literature suggesting that when learners with disabilities are given access to adaptive technology, such as screen readers and magnification tools, their academic engagement and achievement significantly improve (Abner & Lahm, 2002). The ability to navigate learning materials independently promotes not only cognitive development but also self-esteem and motivation, which are crucial for long-term educational success.

The study also highlights the systemic and infrastructural factors that influence the effectiveness of ICT integration in special education settings. Despite the positive attitudes among learners, challenges such as insufficient access to devices, lack of teacher training in assistive technologies, and inadequate funding for ICT infrastructure remain significant barriers (Keitany et al., 2020). These findings echo global concerns about the digital divide in special education, where learners with disabilities are often left behind due to policy and resource constraints (UNESCO, 2021). Therefore, it is imperative for policymakers and educational stakeholders to invest in capacity building for teachers, ensure consistent access to relevant technologies, and create supportive learning environments that address the unique needs of visually impaired learners.

Foley et al. (2014), explored the use of mobile devices as assistive technology for students with visual impairments in resource-limited environments, focusing on an ongoing project in Kenya. This project utilized tablet devices to enhance educational access and independence for university students with visual impairments. Employing a design-based research approach, the authors developed and refined a model for creating communities of practice to support the use of mobile technology as assistive technology. Data collection aimed to assess the efficacy of the model and inform the literature guiding the intervention's design. The study found that mobile devices significantly benefited students by providing access to education, enabling participation in everyday life, and creating a community of practice.

The study by Kisanga et al. (2020), identified two major categories of coping mechanisms for learning ICT among students: problem-focused coping strategies and personal effort coping strategies. Problem-focused strategies included forming social support networks with skilled or sighted peers and seeking training on assistive technology from institutions. Personal effort

strategies involved private learning through the Internet, sharing available resources, using smartphones, utilizing alternative devices, and borrowing assistive technology devices from colleagues.

2.2 Strategies Used to Teach ICT Skills to Learners with Visual Impairment

Mnyanyi et al. (2023) conducted a study guided by the Assistive Technology (CAT) model to investigate the role of ICT-based assistive technology (ICT-Based AT) in empowering individuals with visual impairments. The study involved 25 participants who had completed ICT skills training at the Open University of Tanzania. Through semi-structured interviews, the researchers explored how these individuals acquired ICT skills and the impact these technologies had on their lives. The findings revealed that the training focused on equipping participants with essential skills, particularly in using keyboards and screen readers—two fundamental tools that enable persons with visual impairments to effectively interact with digital devices and content (Mnyanyi et al., 2023).

The study further established that ICT-Based AT had a profound positive impact on the participants' lives. It facilitated greater access to online learning, enabling them to pursue educational opportunities that were previously inaccessible. Moreover, the use of assistive technologies fostered a sense of empowerment, enhancing the users' self-reliance and confidence in both academic and social settings. Importantly, the findings emphasized the role of ICT-Based AT in promoting social inclusion, as individuals were better able to engage with their communities and participate in broader societal activities (Mnyanyi et al., 2023). This supports the broader objective of inclusive education and highlights the importance of expanding access to ICT tools and training for persons with visual impairments.

In a study by Cárdenas et. al., (2021), a bibliometric analysis was conducted using the Web of Science and Scopus databases to identify high-impact scientific articles related to visual impairment, technological devices, ICT, and inclusive education. Additionally, a qualitative assessment was carried out through a Likert scale survey to evaluate the success and effectiveness of technological strategies employed by teachers in teaching English. Data was collected from both teachers and visually impaired students, including those internal and external to the institution. The study found that the incorporation of adapted didactic material according to the needs of visually impaired students (VIS) along with ICT tools. Played an important role in the learning experience of learners with visual impairment with 75% mentioning the resources being significant and functional for learning the English language.

The study further noted that the use of emerging technology and appropriate materials transformed classroom environments into inclusive learning spaces. The study also highlighted that 84% of Visually Impaired Students at Higher Education Institutions (HEIs) and 100% of external Visually Impaired Students, along with 97% of teachers at HEIs, noted that typhlo-technical applications were essential for academic performance in learning English. The JAWS screen reader, a technical support tool, was highly regarded by 69% of VISs at HEIs for covering access expectations regarding evaluation instruments used in their learning process.

Negash (2020), in the study Possible Strategies to be Considered to Realise the Inclusion of Learners with Visual Impairment: A Case Study of Secondary Schools in Ethiopia, highlighted effective strategies for teaching learners with visual impairment. These strategies include encouraging cooperative learning, peer tutoring, collaborative teaching, consultation such as co-teaching, and using assistive technologies and materials.

Kasebusha et al. (2021) conducted a qualitative case study to explore effective teaching strategies for learners with visual impairments and the resulting educational benefits. The study involved 35 respondents, including learners with visual impairments and their special education teachers from Mporokoso and Munali Secondary Schools in Zambia. Using interviews and questionnaires as data collection tools, the researchers applied thematic analysis alongside descriptive statistics to extract key patterns. The study identified a range of specialized instructional strategies, including the use of Individualized Education Plans (IEPs), inclusive education frameworks, and various assistive tools such as audio devices, recorded lessons, magnifiers, and high-contrast learning materials. These methods ensured that visually impaired learners could access, understand, and retain educational content more effectively.

One of the critical findings of the study was the role these strategies played in enhancing participatory learning. By creating an environment where learners could actively engage with lessons, teachers helped foster greater independence and academic confidence among students with visual impairments. This aligns with literature emphasizing the importance of student-centered and multisensory instructional approaches in special education settings. For example, Farrell (2012) argues that such strategies empower learners with disabilities to become active participants in their learning, rather than passive recipients of information. In addition, lesson adaptation and the use of tactile or auditory resources have been linked to improved retention and comprehension among visually impaired learners (Hallahan et al., 2015).

Furthermore, the implementation of individualized and inclusive instructional approaches as reported by Kasebusha et al. (2021) supports the broader advocacy for differentiated instruction in inclusive classrooms. According to Hallahan et al. (2015), inclusive education should not only involve placing learners with disabilities in mainstream settings but must also be accompanied by targeted pedagogical adjustments to meet their specific learning needs. The use of personalized strategies in the Zambian context, therefore, provides a model for integrating visually impaired learners into mainstream education while ensuring that their unique needs are addressed. This underscores the value of teacher training and institutional support in implementing inclusive education effectively.

2.3 Challenges facing visually impaired Learners in Acquisition of ICT Skills

A study conducted by Keitany et al. (2023) utilized a descriptive survey research design to explore the extent and nature of Information and Communication Technology (ICT) use in special primary schools for learners with visual impairments (VI) in Kenya. The researchers selected three public primary schools for learners with VI, targeting a sample of 168 learners and 18 class teachers. An observation schedule served as the primary data collection instrument, providing insights into the actual use and availability of ICT resources within the school environments. The study found that the integration of ICT in teaching and learning was significantly limited by the low ICT competence among both learners and teachers. This deficiency restricted the potential for ICT to enhance the educational experiences of visually impaired students, despite their recognition of ICT's potential benefits.

One of the critical findings from Keitany et al. (2023) was that the lack of technical skills among teachers considerably impaired their ability to incorporate ICT into their lessons effectively. This issue has been echoed by other scholars. For instance, Dalton and Kisanga (2020) highlight that inadequate training and capacity building among educators in sub-Saharan Africa severely limits the deployment of assistive technologies in classrooms, particularly for learners with visual impairments. The lack of confidence and proficiency in using ICT tools often discourages teachers from attempting to integrate them into their pedagogy. In the Kenyan context, Keitany et al. found that this limitation was compounded by an insufficient supply of ICT equipment suited for learners with VI, such as screen readers, Braille displays, and audio-enhanced learning software. Similarly, Foley and Masingila (2014) emphasized the importance of equipping schools with adequate and accessible ICT devices,

noting that without the right infrastructure, even the most motivated educators are unable to implement technology effectively.

The challenges faced by teachers and learners in these schools are not unique to Kenya. Studies conducted in Zambia and other parts of Africa have reported similar barriers to ICT adoption. For example, Mpolomoka et al. (2022) identified poor infrastructure, lack of assistive devices, and insufficient teacher training as significant obstacles to the use of ICT in the education of learners with disabilities. Furthermore, the Zambia Information and Communications Technology Authority (ZICTA, 2022) found that while awareness of ICT is growing among educators, there remains a large gap in practical application due to financial and logistical limitations. This highlights the need for targeted investments and policy reforms to ensure inclusive access to digital learning tools for students with special educational needs.

Despite the highlighted challenges, both teachers and learners expressed strong support for the use of ICT in education. According to Keitany et al. (2023), this enthusiasm was driven by the perceived benefits of ICT, such as improved engagement, personalized learning, and enhanced access to information. These findings align with research by Cosmas and Mnyanyi (2023), who argue that ICT-based assistive technologies can empower visually impaired learners by enabling more independent and meaningful engagement with educational content. However, for these benefits to be realized, there must be strategic efforts to bridge the current skill and resource gaps. UNESCO (2021) advocates for comprehensive teacher training programs, investment in assistive technologies, and inclusive education policies to foster effective ICT use among learners with disabilities.

Muzata (2020) conducted a study on the Utilisation of Computers to Improve the Quality of Learning for Students with Visual Impairment at the University of Zambia. The study was a concept paper which emphasised the critical role of Information and Communication Technologies (ICTs) in fostering independence and enhancing learning outcomes for students with disabilities. The study highlighted the dual benefits of training students with visual impairments in computer skills, which not only facilitate effective learning but also equip them with essential skills for formal and informal employment. The study noted that despite the increase in the enrolment of students with visual impairment, failure to invest in specialised ICTs and computers for students to facilitate effective learning and independence to access the university curriculum may render their admission rhetoric. The study noted the need to provide

the ICT resources necessary for improved learning experience among students with visual impairment.

Kisanga et al., (2020), conducted the study on the access to assistive technology among students with visual impairment in higher education institutions in Tanzania: challenges and coping mechanisms. The study was conducted in a public higher learning institution in Tanzania, selected through purposive sampling. The choice of the institution was due to its extensive experience in supporting students with special education needs in Tanzania and having a higher number of students with visual impairment compared to other institutions. All 37 students with visual impairment at the selected institution were invited to participate in the study, with 17 students agreeing to take part. The study also involved four transcribers from the special education unit who support students with visual impairment in academic matters, making a total of 21 participants. Data collection was done using an open-ended questionnaire and semi-structured interviews.

The results revealed several key challenges faced by students with visual impairment in accessing assistive technology. A significant barrier was the lack of knowledge on how to access assistive technologies, with approximately eight participants reporting challenges due to limited knowledge. Additionally, limited ICT infrastructure and a shortage of assistive technology tools were highlighted as major obstacles. The students demonstrated an over-dependency on sighted peers and readers, which led to low awareness of the potential benefits of assistive technology in enhancing their education. Regular training on assistive technology was recommended for both students with visual impairment and their transcribers to enhance their access to these technologies. The study emphasized the need for higher education institutions to provide sufficient and sustainable financial investment in assistive technology and to improve their affordability to ensure that students with visual impairment achieve educational equity.

Mtonga (2013) conducted a qualitative study aimed at examining the availability and accessibility of computers in schools for the blind in Zambia and to assess the perceived benefits of computer use for learners with visual impairments. The research involved thirty participants, including twelve administrators and teachers, as well as eighteen learners from selected schools catering to blind students. The study uncovered critical challenges related to infrastructure and resource availability. Notably, there was a significant shortage of computers in these institutions, and in some instances, computers were entirely absent. The computer-to-

learner ratio was revealed to be highly inadequate, hindering the integration of digital tools into the learning experiences of visually impaired students.

The findings indicated that 16 out of the 18 visually impaired learners interviewed had no access to a computer at school. This limited exposure to technology was a major barrier to their academic development and digital literacy, putting them at a disadvantage compared to their sighted peers. The study underscored that without access to computer technology, learners with visual impairments were deprived of key educational opportunities, particularly those involving the use of screen reading software, digital textbooks, and online resources. As ICT plays a pivotal role in enhancing learning, particularly for learners with disabilities, the lack of such resources posed a significant concern for inclusive education in Zambia (Mtonga, 2013).

Based on these findings, Mtonga (2013) recommended that all schools for the blind in Zambia should be equipped with functional computers tailored for learners with visual impairments. This includes ensuring that the devices are fitted with speech programs and screen readers to enable students to interact effectively with digital content. Additionally, training programs for both teachers and students were suggested to enhance the effective use of assistive technologies. These recommendations align with global best practices in inclusive education and support the broader goal of promoting equal access to educational resources for all learners, regardless of disability.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter presents the research design and the techniques that the study employed in the collection, organization and analysis of data on the topic "Acquisition of Information and Communication Technology (ICT) skills among learners with visual impairments". It gives a detailed description of the sources of data including, the research design, the target population, the sample size, sampling procedure, methods that were used in the collection of data, and the way the data was finally processed and analysed. It further outlines the key ethical considerations that the study upheld.

3.1 Research Design

This study used a qualitative approach and employed a collective case study design as the study's primary focus was an in-depth understanding of the acquisition of ICT skills among learners with visual impairment in selected special schools of Southern and Lusaka provinces. Creswell (2018) argues that a case study helps with in-depth understanding of real-life phenomena and acquiring holistic and insightful features of real-life phenomena.

This case study was used as it seeks to identify the unique features in the acquisition of ICT skills among learners with visual impairment and this in turn provided answers to the research questions regarding the how learners with visual impairment learn ICT, the strategies used to teach ICT skills to learners with visual impairment, and the challenges facing visually impaired learners in the acquisition of ICT skills. It was therefore the argument of this research that these questions could be best explored and answered through a qualitative case study approach.

Therefore, the rationale of using a qualitative case study approach in this research was to get a detailed description of the views of the targeted population on the topic under investigation. As such, a qualitative approach was appropriate to capture their views on the topic of acquisition of ICT skills among learners with visual impairment, making it possible to have a rich understanding of the topic.

3.2 Target Population

The study comprised of learners with visual impairments, teachers and the resource personnel directly involved in the education and support learners with visual impairments. This selection was based on the relevance of these individuals in comprehending to the topic on the acquisition of ICT skills among learners with visual impairment. Therefore, researcher studied the relevant areas of interest from the groups that were selected and not the whole organizations. The focus was on the actors' perception of events specific acquisition of ICT skills among learners with visual impairment.

3.3 Sample Size

The sample size for this qualitative study was determined based on the principle of "fitness for purpose" as emphasized by Cohen et al. (2011), and informed by scholarly guidance suggesting that 10 to 30 participants are generally adequate for in-depth qualitative inquiry (Ritchie et al., 2014). A total of 20 participants were purposively selected to provide rich insights into the acquisition of ICT skills among learners with visual impairment. The sample included 8 visually impaired learners (4 males and 4 females) aged between 12 and 18 years, drawn from Grades 6 to 12 across four schools two government special schools and two inclusive public schools. These learners were selected to capture a range of experiences from both special and mainstream education settings. Additionally, 10 teachers (6 special education and 4 inclusive education teachers) were interviewed; their ICT competencies ranged from basic to intermediate, acquired through pre-service training, in-service workshops, or self-directed learning. Two resource personnel from the Ministry of Education and District Education Board offices were also included to provide expert perspectives on policy implementation and institutional support for ICT integration. This mix of participants ensured a well-rounded understanding of the contextual, institutional, and personal factors influencing ICT skill acquisition among learners with visual impairment.

3.4 Research Site

The study was conducted across four schools in Lusaka and Southern Provinces, chosen for their relevance to the education of visually impaired learners. Munali Boys and Munali Girls Secondary Schools are inclusive institutions integrating visually impaired learners into mainstream classrooms with additional support. Rusangu Secondary School is also inclusive, offering resource units for learners with special needs. St. Mulumba Special School, located in

Choma, is a special school exclusively for learners with disabilities, including visual impairments. These diverse sites provided a comprehensive view of ICT access and skills acquisition in both inclusive and special education settings.

3.5 Sampling Procedures

Purposive sampling was used to select participants. Participants were selected based on their specific and special knowledge on the implementation process. Creswell (2007), argues that, purposive sampling is used when the researcher selects individuals or a site because they can purposefully inform an understanding of the research problem or central phenomenon of the research study. This method was used to ensure repetitiveness in terms of only accessing key individuals who are involved in the processes and not those who are unaware of the unique features in the acquisition of ICT skills among learners with visual impairment and eliminated reasons for including participants just for the sake of ensuring a probability sampling. By purposively selecting participants, the research aimed to capture diverse perspectives and experiences, contributing to the depth and richness of the qualitative data gathered.

3.6 Data Collection Methods

Since the subject matter of this particular study was concerned with getting in-dpeth information on the acquisition of ICT skills among learners with visual impairment, the study used one on one interviews and focus group discussions with the study participants to understand the perspectives of different groups on the subject under investigation. The one on one interviews and focus group discussions were audio recorded to help capture the conversations or discussions which were later transcribed before the data analysis process. However, the study sought out only the most knowledgeable and eligible respondents to contribute to the matters concerning the topic under investigation. Therefore, interviews and focus group discussions provided a unique opportunity to uncover rich and complex information from the study participants. With these types of techniques, the researcher had a better chance to obtain participant’s opinions, views, perceptions and experiences in detail. Further, these allowed the researcher to clarify any ambiguities and important points.

3.7 Data Collection Instruments

The data collection instruments for qualitative research consisted solely of semi-structured interview guides and focus group discussion guides. These instruments were designed to

facilitate open-ended discussions, allowing participants to express their thoughts, experiences, and perceptions freely. By utilizing qualitative instruments exclusively, the research sought to delve deeply into the lived experiences of visually impaired learners, teachers and the resource personnel, providing rich insights into the acquisition of ICT skills.

3.8 Data Analysis

The researcher first transcribed the interviews and focus group discussions that were conducted with the participants on Microsoft Word software to ease the work of categorizing the data. The researcher then used thematic analysis to organize the interviews and focus group discussions data into categories and themes as they emanated from the data. The researcher then organized findings as applicable, with attention to how the findings informed the acquisition of ICT skills among visually impaired learners.

3.9 Trustworthiness of the Study

Trustworthiness refers to how much trust can be placed in the study by showing that the researcher did everything possible to ensure that the data were appropriately and ethically generated, analysed and reported (Calson, 2010). Qualitative research is characterised by multiple realities and, therefore, multiple truths (Chilisa and Preece, 2005). Spencer et al. (2014) recommends concepts that can be used to ascertain trustworthiness in qualitative research studies, such as, credibility, transferability, dependability and confirmability. Credibility refers to the extent to which qualitative data are accurate and appropriate and, dependability focuses on the degree to which appropriate procedures and reasonable decisions have been followed throughout the study to ensure consistency and its replicability (Denscombe, 2017). Transferability refers to the extent to which the findings can be transferable to other similar research settings. Confirmability on the other hand refers to the degree to which research findings are supported by data collected (Cohen et al., 2013).

In this study, the researcher first created rapport with the research participants and also maintained credibility by piloting the research instruments with LVI in a similar special school. The period for data generation in the field was prolonged, and this process enabled the researcher to gain in-depth understanding of individuals and their experiences with respect to teaching strategies that are used. The use of multi-methods reflects an attempt to build credibility and dependability into the data generation process. Reflexivity on the part of the

researcher was very important. Therefore, the researcher kept a memo to record schedules and appointments, events that were happening and that could affect the study.

Shenton (2004) describes confirmability as the qualitative investigator's comparable concern to objectivity. He further explains that steps must be taken to help ensure as far as possible that the findings of the research are the result of the ideas and experiences of the participants rather than the characteristics and preferences of the researcher. In this study, the participant's viewpoints provided validation for this study through audit trailing and the researcher documented all the necessary procedures and decisions undertaken in different stages. Additionally, throughout the data collection process, the researcher adhered to bracketing guidelines (epoché) in order to avoid making personal judgmental influences. Bracketing is a methodological device of phenomenological inquiry that requires deliberate putting aside one's own belief about the phenomenon under investigation or what one already knows about the subject prior to and throughout the phenomenological investigation (Speziale et al., 2011).

Transferability is the same as external validity in quantitative research. Quantitative researchers randomly select representative samples from populations for generalisation purposes. On the other hand, qualitative research focuses on a small sample of participants and the data cannot be generalised to a broader population (Chilisa and Preece, 2005). In this study, the researcher enhanced transferability of this inquiry to other contexts by generating data from four secondary schools from two regions in Zambia with similar educational settings. Furthermore, the researcher triangulated the data as one way of making the research findings credible. This study used different sources of information and different data generation strategies in order to strengthen the findings. Member-checking involved the researcher sharing the research results with the participants in order to seek feedback on the findings. Transcribed interview and FGD data were shared with the participants to determine the accuracy of the provided information.

3.10 Ethical Considerations

To uphold research ethics, informed consent procedures followed country standards. The participants were encouraged to ask questions throughout the consent process and also throughout their entire participation in the study. Further, the researcher ensured participant confidentiality throughout the study. The researcher maintained strict participant confidentiality by collecting data using an ID number that was only linkable to the participant's information files and the information that was obtained was kept with utmost confidentiality.

Furthermore, during recruitment and implementation of interviews, the researcher counselled participants that their participation in the study was voluntary and regardless of the data they provided, their stay and position within the school community and outside, was not going to be impacted in any way. Hence, the researcher approached participants who agreed to participate in a discrete manner to maintain confidentiality. Additionally, prior to seeking ethical clearance, the researcher presented the proposal to the University of Zambia, Ministry of Education, and the targeted schools to request for permission to conduct the study in the selected schools. Then, the research paper, and other subsequent modifications, were reviewed and approved by The University of Zambia and Research Ethics Committee before the commencement of the study.

CHAPTER FOUR

PRESENTATION OF FINDINGS

4.0 Introduction

The chapter presents the study findings, organized into themes that enabled comparison across the four schools. For each theme, the findings integrate the perspectives of teachers, resource personnel, and leaners to offer a holistic view of how each school supported the acquisition of ICT skills among the visually impaired learners.

Demographic Characteristics of Participants

MUNALI GIRLS PUPILS

- 2 Totally Blind, 3 Partially sighted between 15 and 22 years of age, Grade 8 to 12 Junior and Secondary

Teacher One

- 10 years' experience degree holder, between 30 and 40 years of age

Teacher Two

- 4 years' experience diploma holder, between 25 and 30 years of age

MUNALI BOYS PUPILS

- 1 Boy totally blind, 4 partially sighted between 16 to 24 years of age.

Teacher One

- 16 years' experience diploma holder, between 35 and 40 years of age.

Teacher Two

- 8 years' experience degree holder, between 36 and 41 years of age.

ST MULUMBA SPECIAL SCHOOL

- 2 boys and 3 girls two of the learners are partially sighted and three are totally blind

Teacher One

- 12 years' experience degree holder, between 39 and 43 years of age

Teacher Two

- 6 years' experience diploma holder, between 33 and 37 years of age

Resource Personnel

- 5 years' experience diploma holder, between 30 and 35 year of age

RUSANGU SECONDARY SCHOOL

- 4 boys and 1 girl (between 14 and 19 years) 3 are partially sighted and 2 totally blind

Teacher One

- 5 years' experience degree holder, between 30 and 35 years of age

Teacher Two

- 17 years' experience degree holder, between 45 and 50 years

Resource Personnel

3 years' experience certificate holder

4.1 Ways Learners with Visual Impairment Learn ICT

Leaner across all the schools shared their experience on how they learn ICT skills. At St. Mulumba, the learning process was characterized by a structured approach where leaners started with theoretical lessons in the classroom before moving to hands-on practice in the computer lab. The leaners emphasized the role of JAWS in their learning, with teachers introducing ICT concepts as early as grade 5. They explained:

They started teaching me when I was in grade 5. They first started defining what a computer is. They brought the hardware that is on a computer and showing us, this is a mouse, this is a keyboard. Then they went on and taught us how to switch on the computer. And then they started teaching us one by one how each one of the hardware works. Like this keyboard has letters and other buttons and this mouse works like this (R4: Leaner at St. Mulumba).

Another leaner added:

There are letters that have been marked, so I just have to master those letters, then I will be able to allocate those other letters (R3: Leaner at St. Mulumba).

While the leaners at St. Mulumba reported a structured way of learning ICT skills, leaners at Munali Boys shared that their learning was challenging due to lack of assistive devices to aid their learning experience. One leaner contrasted their experience with their previous school, where such tools were available which made it much easier for them to learn ICT. They explained:

Like here sir, I do take computer studies, but when it comes to the issue of computers it has not been easy, when it comes to the issue of operating the computers because there are no

JAWS and all that. But previously, where I was, it was much easier because everything was there (R3: Leaner Munali Boys).

At Munali Girls, leaners felt that teachers primarily focus on sighted leaners, noting that they write on the board without considering the needs of visually impaired learners. As a result, they rely on nearby classmates to help them take notes. They shared:

For me, the concentration is usually on the sighted; they just concentrate on writing on the board. If you want to write notes, the only thing you have to do now is to ask the person who is near you to write the notes for you (R1: Leaner Munali Girls).

Leaners at Rusangu Secondary shared that their learning is more of copying notes and listening when the teacher is teaching. They put it:

We learn by copying notes and through verbal explanations when the teacher is teaching (R2: Leaner Rusangu Sec School).

4.1.1 Personal Efforts in Learning ICT Skills

Leaners from all schools shared the efforts that they put in their personal capacity to learn the ICT skills. Leaners at St. Mulumba noted that personal initiatives play an important role in acquiring ICT skills. They stated that they made personal efforts to follow the teacher to ask where they did not understand. Additionally, they also shared that beyond the school environment they utilised the internet at home. Furthermore, they emphasized the importance of personal practice and self-motivation in acquiring ICT skills. Through persistent practice, one leaner shared how they discovered additional ICT skills beyond what was taught in the classroom, such as navigating the internet, sending documents, and transferring files to external storage devices like memory cards or flash drives. They put it:

When I'm studying, where I can't understand, I go to the teacher and he or she explains more for me to understand (R2: Leaner at St. Mulumba).

If I haven't understood, I go and ask the teacher and he or she explains to me (R1: Leaner at St. Mulumba).

We learn through the internet; at home I use the phone for my uncle (R3: St. Mulumba).

At personal level, it's just concentration and the practising every day. The skill that I acquired from the teachers, I had to put it into practise. Then through practise, I'm able to discover some of the other things that I was not told (R4: St. Mulumba).

I was just taught how to use maybe Microsoft word, then through practising, I was able to know how to go on the internet and how to send documents. Things like trash and memory card (R4: St. Mulumba).

At Munali Boys and Munali Girls, the personal efforts of leaners to acquire ICT skills varied, some students admitted to not having done much and is still in the process of arranging for additional resources. Others shared that they had been trying to learn at home, although they admitted that it had been hard because of lack of assistive software like JAWS. They shared:

I have not done anything I am still arranging for that (R1: Leaner, Munali Girls)

For me I have been trying to type on my brother's computer, but it doesn't have JAWS, so, it is hard (R2: Leaner, Munali Girls).

I use the phone at home but it does not have the sound (R3: Leaner, Munali Boys).

4.2 Strategies Used to Teach ICT Skills to Learners with Visual Impairment

The curriculum and teaching methods varied across the schools with St. Mulumba having a curriculum that is adapted to meet the needs of visually impaired learners, while at Munali Boys, Munali Girls and Rusangu curriculum lacks clear integration for visually impaired students. Teachers at St. Mulumba shared that they employ a variety of teaching methods, including demonstrations, hands-on practice and question-and-answer sessions. They explained that these methods help leaners to develop a thorough understanding of ICT skills, ranging from basic keyboard orientation to navigating software like Microsoft Word. They put it:

The methods that are used in teaching the learners are similar, but we modify them to suit their needs (Teacher 2, St. Mulumba)

We use demonstration methods and hands-on approaches where the leaners are taken to the computer lab, which allows them to have a clear understanding of things like the keyboard and typing in Word. (Teacher 1, St. Mulumba).

The resource personnel shared that at St. Mulumba the curriculum for ICT education is designed to be hands-on, with a strong emphasis on practical learning through methods like demonstration and presentations. They explained that they not only provide theoretical understanding of the computer and other ICT materials, but also offer practical understanding by exposing leaners to these materials to practice in the computer laboratories. They put it:

We usually use the demonstration method and we also use the presentation so that our learners can know a computer, not just by theory, but also in a practical way (Resource Personnel St. Mulumba).

The situation is different at Munali Boys, Munali Girls and Rusangu where the ICT curriculum lacks clear integration for visually impaired students. At Munali Boys, teachers expressed uncertainty about the existence of the curriculum for leaners with visual impairment. They put it:

Not very sure on the aspect of the curriculum if it has some elements of ICT in relation to the visually impaired (Teacher 2, Munali Boys).

At Munali girls, teachers stated that the curriculum used has some components of ICT but noted that there is a lack of clear guidance or policy on how these should be implemented, particularly for visually impaired students. They explained that despite the ministry of education's emphasis on ICT education, the curriculum remains unclear and inadequately defined. Additionally, teachers shared that there are limited computers available, and most of them are not equipped with essential assistive software like JAWS. They explained:

The type of curriculum has some ICT components however the information is not clear enough on that aspect or there is no clear policy though there has been more emphasis from the ministry there is no proper clarity in the curriculum… Then also there are limited computers and most of them do not have assistive software like jaws (Teacher 1, Munali Girls).

At Rusangu teachers shared that teaching methods are more remedial and rely heavily on improvisation due to the lack of appropriate tools. They noted:

We do more of remedial work and also because we do not have enough tools, we give them books with ICT information (Teacher 1 Rusangu).

The resource personnel explained that the teaching methods employed at Rusangu Secondary School focus on giving students ample practical time to master essential aspects of computer use.

Some of the methods used include having them to have more practical time to learn and having them to master some of the important aspects of the computer (Resource Personnel Rusangu Sec School).

4.2.1 ICT Skills Training and Learning Outcomes

The ICT skills taught to visually impaired leaners varied significantly between schools, with St. Mulumba offering a comprehensive, tailored curriculum that emphasizes independence through the use of assistive technologies. In contrast, Munali Boys, Munali Girls and Rusangu focus on more basic ICT skills due to a lack of specialized resources, which limits the depth of instruction and hands-on learning opportunities.

At St. Mulumba, teachers shared that leaners are taught a comprehensive range of ICT skills tailored to their specific needs. These skills include typing, creating and saving documents, and navigating software like Microsoft Word, Excel, and PowerPoint. The teachers emphasized the importance of assistive technology in the ICT learning process for learners with visual impairments. They stated

They are taught how they can properly use their hands, and one of the most important things is to make sure that the leaners know the home keys like letter J and letter F (Teacher 1, St. Mulumba).

The kind of skills taught to the leaners are typing, creating documents, using Word, Windows, saving, printing, navigation, keeping data, and other related tasks with the help of assistive technologies and devices (Teacher 2, St. Mulumba).

Leaners learn to navigate Windows, mainly Word, Excel, and PowerPoint, using the assistive technologies provided (Teacher 1, St. Mulumba).

In contrast, the ICT skills taught at Munali Boys are more basic and limited due to a lack of specialized tools. The focus is primarily on sharing theoretical knowledge of basic computer functions, such as typing and file creation, with less emphasis on practical application due to resource constraints. As one teacher explained:

We teach skills like typing, creating files, and how to access and save information. However, this is more theoretical because there are few computers, and even those do not have assistive technology like JAWS (Teacher 2, Munali Boys).

Similarly, at Munali Girls, the skills taught are restricted due to the limited availability of ICT materials. Teachers strive to cover basic ICT skills, but the absence of critical tools like speech narrators hampers their ability to provide hands-on learning experiences.

There is always an effort to teach the learners since they tend to face challenges when it comes to practicals. Even when the child is sent to the computer labs, there is no proper software, like the speech narrators, that can be used by the learners. As a result, it becomes very difficult as a teacher to teach these skills to the learners. Sometimes we can just be explaining something in order for the leaners to learn without proper practice (Teacher 1, Munali Girls).

Rusangu Secondary School, like Munali Boys and Girls, faces challenges in teaching ICT skills to learners with visual impairments due to a limited number of computers and a lack of assistive technology like JAWS. Despite these difficulties, teachers strive to support the students by providing braille books with ICT information and offering theoretical explanations. As one teacher noted:

We teach them skills like word processing, web searching, and emails; however, we face challenges with practicals due to the lack of JAWS. So, we normally give them books with ICT information and explain to them theoretically (Teacher 1, Rusangu).

Resource personnel shared similar sentiments, noting that the ICT skills taught at Rusangu Secondary School are aimed at familiarizing students with the fundamental components of computers and related devices. However, they mentioned that despite their approach, the limited availability of assistive devices and specialized software like JAWS hinders the learners' ability to practice and fully utilize the skills being taught. They explained:

Although we focus on teaching basic computer skills, the lack of assistive devices and specialized software like JAWS limits the students' ability to fully practice and apply what they have learned (Resource Personnel, Rusangu).

The leaners across the schools reported learning a range of essential ICT skills. At St. Mulumba, they acquired foundational skills such as typing, copying, pasting, and cutting within

Microsoft Word. They also learned how to navigate the internet, transfer files to external devices, and discovered new concepts like online banking and trading. Leaners at

Leaners at Munali Girls highlighted the limitations in their ICT skills, attributing them to the lack of assistive devices. At Rusangu Secondary School, leaners learnt basic ICT skills such as turning on the computer, typing on the keyboard, using the internet, and managing external devices. They shared:

I know some of the skills like typing, copying, pasting, and cutting. Other things like, even going on the internet I am able to go on internet, I can send documents. Like maybe songs, I can send them into a memory card or a flash drive (R4: Leaner at St. Mulumba).

The teachers, like the History teacher, encourage us to use the internet, but how can I use the internet without assistive devices? (R2: Leaner Munali Girls).

I have learned how to switch the computer on and off, type on the keyboard, and play music (R1: Leaner Rusangu Sec School).

4.2.2 Facilities and Resources

Across all schools there was a shared consensus with regards to the availability of ICT facilities for learners with visual impairment, with many stating that there is lack or limited recourses. However, this differs in magnitude with teachers at St. Mulumba sharing that their computer lab is equipped with computers that have JAWS software, which provides screen reading capabilities, and other assistive devices such as speech narrators and braille embossers. They shared:

In terms of the facilities, there are computers that have JAWS and other assistive devices. (Teacher 1 St. Mulumba).

Some of the facilities include JAWS software, computers, speech narrators, and braille embossers (Teacher 2 St. Mulumba).

We use these assistive technologies to ensure that learners can access and interact with digital content (Teacher 1 St. Mulumba).

Similarly, the resource personnel shared that St. Mulumba, has established facilities like a computer lab to support visually impaired learners in acquiring ICT skills. While this lab is equipped for basic computer studies, the resource personnel shared that the school still face

challenges with other assistive devices. Despite this, the available resources, such as computers with JAWS software, have been instrumental in helping students bridge the gap between braille and digital text.

Some of the facilities which have been put in place, like here in St. Mulumba, we have a well-equipped computer lab, which has been put in place so that it assists our learners to learn computer studies (Resource Personnel St. Mulumba).

So, we may say, though not well equipped in terms of assistive device, but we have the computer itself with the help of JAWS, we are somewhere (Resource Personnel St. Mulumba).

They noted the importance of teaching ICT skills to learners with visual impairments for their future educational endeavours and independence. They put it:

learners to be independent and free, to bridge the gap between braille and ink, and well, once they get well acquainted to the computer, it helps them in the future when they go to college.

The sentiments by teachers and resource personnel were confirmed by leaners who praised the availability of specific tools such as the mouse, keyboard, system unit, monitor, and specialized software like JAWS, which is crucial for visually impaired learners. They also mentioned embossers that convert printed documents into Braille, enabling them to read and write in their preferred format.

The school has computer lab, it has computers that are friendly to us which uses a software which is called Jaws, then there are things like embossers which we use to put written documents into our type of writing which is braille (R4: Leaner at St. Mulumba).

In contrast, Munali Boys, Munali Girls and Rusangu Secondary School teachers shared that they face significant resource constraints that limit their ability to provide effective ICT education. At Munali Boys, both teachers and leaners shared that the school lacks essential assistive technologies like JAWS. Teachers noted the need for assistive devices like computer with JAWS software to aid their teaching as well as the learning experience of ICT by learners with visual impairment. They shared that they often have to improvise, using whatever limited resources are available, which negatively impacts the quality of instruction. They stated:

There are not so many facilities in order to teach the learners these ICT skills. So, there is need for more computers in the school and also speech devices. Mostly these ICT devices are

very expensive, which is difficult for the learners…. It is just mostly improvisation on the part of the teachers which affect the learning experience of the learners (Teacher 2, Munali Boys).

Like teachers, leaners shared that the school has significant limitations in supporting visually impaired students in acquiring IT skills. Participants unanimously agreed that the environment is not supportive. They noted the lack of JAWS software on computers, which is essential for visually impaired students to navigate and use the computers effectively. They explained their difficulty in seeing the computer screen clearly and needing to get very close to it, which complicates the learning process.

As for the blind, those computers do not have JAWS, so for one to see they need assistance from a friend (R1: Leaner Munali Boys).

Like my friend has said in our condition we can't like see very well, and we have to get closer to the computer so, it hasn't been easy (R2: Leaner Munali Boys).

Munali Girls faces even greater challenges, with teachers sharing that most computers lack any form of assistive software, such as JAWS. This is compounded by shortage of trained personnel making it extremely difficult for students to practice and learn ICT skills. They explained:

There are no proper facilities that are supportive to the learners. It is challenging since the children are left behind and also lack of human resource (Teacher 2, Munali Girls).

There are not enough computers and other ICT-related equipment like tablets, and even those that are available do not have assistive software (Teacher 1, Munali Girls).

Leaners echoed these sentiments, stating that the school has inadequate ICT resources to support the acquisition of ICT skills for learners with visual impairments. They expressed the need for more tools including phones to enhance their learning experiences. They also noted that despite having some computers at school they did not provide a supportive environment for their learning due to lack of assistive software like Jaws. They put it:

They need a lot of things; it can be good if we had phones (R2: Leaner at Munali Girls)

They don't provide ICT tools; there are computers, but they are few and are not supportive, the assistive technology like Jaws is not there (R1: Leaner, Munali Girls).

Rusangu Secondary equally lack proper assistive devices, such as computers equipped with JAWS. Despite having a computer lab, the teachers shared that most of the computers are not

equipped with JAWS software, which makes it extremely difficult for students to practice and learn ICT skills. They noted:

Most of the computers do not have assistive software like JAWS, which is very difficult for me as a teacher to teach these skills to our friends with visual impairment (Teacher 1 Rusangu Secondary).

Like the teachers, the resource personnel noted that the facilities to support the acquisition of ICT skills among visually impaired learners were somewhat limited. The resource personnel shared that the primary resources available include desktop computers. However, despite having these computers and books with ICT information, they shared that there is lack of specialized assistive technologies which restricts the effectiveness of the learning process for these students. They put it:

Some of the facilities are mostly computers or desk top computers. Then we have some books that have ICT information; however, they are not so many of the assistive technologies that are been provided (Resource Personnel Rusangu Sec School).

The leaners also shared similar views, noting that the classroom environment at the school poses significant barriers for visually impaired leaners in acquiring ICT skills. They shared that the computers are not configured for visually impaired leaners, hinders their ability to engage with ICT lessons effectively. This resulted in an unequal learning experience where sighted students are at an advantage. They shared:

Others are able to see while we cannot see what is being taught on the computer (R1: Leaner Rusangu Sec School).

The computers are not configured for the visually impaired leaners (R4: Leaner Rusangu Sec School).

4.3 Challenges facing Visually impaired Learners in Acquisition of ICT Skills

Teachers across all three schools face various challenges in delivering ICT education to visually impaired students, though the nature of these challenges differs. At St. Mulumba, teachers shared the challenges mainly related to the insufficient number of assistive devices, limited time allocated for teaching ICT skills, and the shortage of specialized ICT teachers. They put it:

Challenges include lack of assistive devices and also specialist teachers in this area. (Teacher 2: St. Mulumba).

The time to teach the content is not enough, especially when teaching skills like Word, which require learners to be familiar with the keys (Teacher 1, St. Mulumba).

Several challenges impeding the effective teaching and learning of ICT among visually impaired students were shared by the resource personnel at St. Mulumba. They explained that the most pressing issue was the inadequacy of facilities, as the computer lab is too small to accommodate the growing number of students with various disabilities. The lack of specialized equipment, such as headsets for students using JAWS, further complicates the learning process. Additionally, the need for constant reorientation on shared computers due to interference by other learners poses a significant barrier to consistent learning. They explained:

Some of the challenges like the biggest one, I mean we were primary, we went to basic and now we are secondary, meaning the school has grown and we are still using the same computer lab, the same capacity, so already we can tell to say the computer lab is small, cannot accommodate all the learners (Resource Personnel St. Mulumba).

It's not easy to teach them, especially the learners with visual impairment, because they need headsets, and the school is not able to buy those headsets. So, the school has told them to bring headsets, whenever they are coming for school, so that they can be using the same headsets in the computer lab, and some families are poor, they hardly afford a meal, and now you tell them to bring headsets, so it's a challenge as well (Resource Personnel St. Mulumba).

when it comes to the Hearing Impairment, with them they use sight, so JAWS has got no use to them, so they can even end up uninstalling the software, or do something (Resource Personnel St. Mulumba).

Despite having a computer lab and some assistive software like Jaws, leaners at St. Mulumba shared various challenges. One major issue was the inadequate number of computers, which they shared that it limited their learning experience by hindering their ability to practice and reinforce their skills. Another issue stemmed from insufficient number of headsets and speakers necessary for using JAWS software. Additionally, the process of mastering the keyboard as visually impaired learners was another challenge that was shared. One leaner described how the process of typing was initially slow and cumbersome, as it took them time to memorize the keyboard layout and locate each letter by touch.

They shared:

We need to be, let me say, we need to practise. So, when we learn, when we want to go interact with the computers in the computer lab, there the computers are limited (R2: Leaner at St Mulumba).

At home, we don't have computers, but I want to learn through Internet. It's difficult for me to learn. (R1: Leaner at St. Mulumba).

We didn't have a lot of headsets and speakers… sometimes you find that maybe your friends are busy doing the practicals or practising, and you are just seated because you don't have headsets or speakers (R4: Leaner at St. Mulumba).

It takes time for a visually impaired person to know how to use it… it really takes time for you to know that when you place your fingers here, you will be able to allocate other letters (R4: Leaner at St. Mulumba).

Munali Boys faces more severe challenges, including the complete absence of necessary tools like computers with JAWS, which forces teachers to constantly improvise. Additionally, teaching students with multiple disabilities, such as those who are both visually and hearing impaired, adds another layer of difficulty. They shared:

Others may multiple conditions apart from visual impairment, so it's difficult in teaching them, like those who are both visually and hearing impaired, and there are also slow learners (Teacher 2, Munali Boys).

Some of the challenges faced usually is that on everything we just need to improvise when teaching these learners due to lack of assistive devices. Then the lack of access to ICT devices like computers with JAWS means learners cannot practice effectively (Teacher 1, Munali Boys).

Several challenges were identified by Munali Boys Leaners, primarily revolving around inadequate resources and ineffective teaching methods. They mentioned that teachers often neglect to accommodate visually impaired students. They added that teachers do not bring computers close enough for visually impaired students to follow along, simply continuing their lessons without proper adaptations. They put it:

Mostly as my friend has said, it is more like you are in class, a teacher just comes, noticing that you are visually impaired just starts writing on the board without saying anything (R2: Leaner Munali Boys).

When they're trying to show you how to do different things on the computer, but they are not bringing you like, close to the computer so that you are able to see what others are doing, they just go on teaching (R1: Leaner Munali Boys).

Munali Girls teachers also shared significant challenges, particularly lack of assistive devices which is compounded by the economic background of the leaners, who often cannot afford ICT devices. They put it:

Some of the challenges include the fact that we don't have enough computers and even those that we have do not have applications like JAWS. Then also most of the children they come from not well to do families as a result even if when they are asked to buy some of the ICT devices it is always difficult for them to do so and this hinders their acquisition of the ICT skills (Teacher 1 Munali Girls).

Similarly, Munali Girls leaners shared several challenges which hinder their ability to learn ICT skills effectively. They identified practical challenges, including limited access to computers and insufficient practice time. They reiterated the lack of necessary software like JAWS, making it difficult to verify their typing. They noted:

Practical is a challenge; the computers are a few, so, the time to practice is a challenge (R3: Leaner Munali Girls)

Like my friend has said, the computers do not have JAWS, so even if I may know how to type, I cannot tell what I am typing (R2: Leaner Munali Girls).

Teachers at Rusangu like those at Munali boys and Munali Girls shared similar challenges relating to lack of assistive devices which affect the learning experience of learners with visual imapairment. They also added that the school lacks human resource with competency in braille, which is exacerbated by lack of print materials like braille embossers. They explained:

The school has a number of challenges when it comes to meeting the learning needs of our friends with visual impairment. You know, teaching ICT requires practicals and so, lack of assistive devices with sound hinders them from practicing (Teacher 2, Rusangu).

There is also lack of in-service training in the use of braille and as a school we lack useful tools like braille embossers (Teacher1, Rusangu).

The resource personnel indicated that Rusangu Secondary School faces significant challenges in implementing its ICT training strategies. The most pressing issue is the lack of adequate assistive devices, such as computers and laptops, and essential software like JAWS, which is crucial for visually impaired learners. They noted that the shortage of resources severely limits the effectiveness of the ICT training and hampers the students' ability to fully engage with the learning material. They put it:

Some of the challenges include not having adequate assistive devices like computers, laptops, and lack of important software like JAWS that is important for the visually impaired leaners. So, if you don't have these things, it is hard for learners to appreciate what they are being taught (Resource Personnel, Rusangu).

The leaners face multiple challenges in acquiring ICT skills, primarily due to a lack of resources and adaptive technology. The absence of assistive devices like headsets and visually impared-friendly keyboards further hinders their ability to engage fully in ICT lessons. They also noted that the teaching methods do not accommodate the needs of visually impaired leaners, making it difficult for them to grasp visual content. They noted:

There are shortages of computers in the lab, so we have to share with sighted students, which makes it challenging for us (R2: Leaner Rusangu Sec School).

There are no gadgets like headsets, and the keyboards are not suitable for us visually impaired learners. The computers are not configured to help us with visual impairment, and teachers draw diagrams on the board that we can't see (R3: Leaner Rusangu Sec School).

4.3.1 Addressing Curriculum Gaps and Resource Accessibility in ICT Education for Visually Impaired Learners

To improve ICT education for visually impaired learners, teachers resource personnel and Learners themselves across all schools highlighted several key areas for improvement. At St. Mulumba, teachers emphasized the need to increase the time allocated for ICT practice, allowing learners sufficient time to apply what they learn in class and bridge the gap between theory and practice. Additionally, they suggested expanding ICT education to cover all secondary grades, rather than limiting it to grades eight and nine as in the current curriculum.

Furthermore, they stressed the importance of integrating ICT training more effectively into special education programs for teachers, to enable them to provide effective instruction to visually impaired learners.

It is important for the leaners to learn ICT and all teachers who teach ICT to the learners need to be motivated, they need to be given more time on the computers for them to have more practice. And learners also need to be more interested in ICT skills this even helps them even at tertiary level (Teacher 1, St. Mulumba).

Some of the recommendations for the institutions that are offering special education should include, the training of ICT skills to the teachers being trained (Teacher 2 St. Mulumba).

ICT should be in all the secondary grades since at the moment it is only at grades eight and nine (Teacher 1, St. Mulumba).

The resource personnel shared the recommendations which emphasized the need for the administration to seek external assistance to expand and improve the facilities. Specifically, they proposed to build a larger computer lab or separate labs for different disabilities to enhance the learning environment for learners with different disabilities. Additionally, they highlighted the need to equip the computer lab with essential tools like headsets for visually impaired learners for easy teaching of ICT skills, which would help in building a better tomorrow. They explained:

The administration should try and lobby for assistance out there... so that they can help us build a bigger lab, which can accommodate all the learners... and buy headsets for the children, learners with visual impairment (Resource Personnel St. Mulumba).

If we can equip our computer lab with headsets, on each and every computer, it will be very easy for us to teach computer studies to our learners, and build a better tomorrow (Resource Personnel St. Mulumba).

Based on their experiences, leaners provided several recommendations to improve the learning environment for visually impaired leaners. They emphasized the need for increased availability of ICT resources, particularly more computers, headsets, speakers, and embossers, to ensure that all leaners have equal access to learning opportunities. They expressed a desire for the introduction of computer studies at the senior level. They also suggested increasing the number of computers and ensuring more regular interaction with these devices. Additionally, they

highlighted the importance of learning ICT skills for easing their daily work, citing the need for typing assignments when they get to college. They put it:

*I would love to see a computer subject introduced from grade 10 to grade 12, so that we don't forget what we learned from grade 5 to grade 9 (*R4: Leaner at St. Mulumba).

I think for us here, because they have to provide more computers, like as we are going to our universities, then we don't have these skills It is not that all lecturers can understand us writing, so I think when we have more computers, it can be easier for us to learn (R3: Leaner at St. Mulumba).

We need to do more of practising, then also we need more computers because it is better to learn ICT so that it will be helping us in a lot of things. For example, sir, as we are going to colleges, like an assignment, sir, we just have to type in the computer and send it to the lecturer (R1: Leaner at St. Mulumba).

They called on the Ministry of Education to make computer studies compulsory in special schools, so that visually impaired leaners across the country have access to ICT education. They emphasized that this policy should be accompanied by adequate support in the form of equipment and resources for schools that currently lack these tools. They reiterated:

*Maybe they should declare computer studies compulsory in special schools… but they should also support through offering those equipments for computers in all schools that do not have those computers (*R4: Leaner at St. Mulumba).

To improve ICT education for visually impaired learners, teachers at Munali Boys recommend increasing the availability of computers and speech devices, making these technologies more affordable, and ensuring that the curriculum is clearly defined and aligned with the needs of visually impaired students. Proper orientation for special education teachers and more teaching materials was also highlighted as essential. They shared.

Among some of the recommendations is the need for more computers in the school and also speech devices (Teacher 2, Munali Boys).

There is need to be more clarity on the curriculum and proper orientation for special education teachers to teach ICT (Teacher 1, Munali Boys).

More ICT devices and technologies need to be made available, and the computers should be more accessible to learners (Teacher 1, Munali Boys).

Leaners echoed the sentiments by the teachers calling for more assistive devices like computers and sound software to enhance their learning experience. They shared:

We need more computers and they should be installed with the JAWS so that it can be easy for us to practice (R2: Leaner, Munali Boys).

At Munali Girls, teachers highlighted the need for more well-trained personnel and an increase in the availability of ICT devices. They also emphasized the importance of installing assistive software like JAWS on all computers. Additionally, they urged the government to provide adequate funding and ensure proper network connectivity, particularly in rural areas, to support online learning. They shared:

There is a need to have more and well-trained personnel to teach these ICT skills to the learners (Teacher 1, Munali Girls).

These devices that are provided in the schools for the blind need to be installed with assistive devices like JAWS and other supportive software (Teacher 2, Munali Girls).

The government needs to provide ICT devices in all special schools to support the learners, and there is a need for more funding in these ICT areas (Teacher 2, Munali Girls).

Similarly, Munali Girls leaners recommended the provision of JAWS software and braille embossers to help them type their own work and translate it into braille. They emphasized that these resources would significantly improve their learning experience. They shared:

They should bring more computers with JAWS, it can be easy, at least you can know what you are typing (R2: Leaner Munali Girls).

They should buy the Braille embossers (R1: Leaner Munali Girls).

At Rusangu Secondary School, teachers expressed several key recommendations to enhance the education of visually impaired learners. They highlighted the need for modern computers capable of running various instructional software and hardware tailored for special learners. Additionally, they emphasized the importance of allocating sufficient contact time to meet the individual needs of visually impaired students. The teachers also underscored the necessity of providing adequate teaching and learning materials specifically designed for these learners. Furthermore, they called for periodic in-service training for teachers working with special needs students to ensure they are equipped with the latest skills and knowledge. They put it:

We need modern computers that are capable of running various instructional software and hardware that are designed for special learners. Then also, there must be adequate teaching and learning materials for learners with visual impairment (Teacher 2, Rusangu).

There is need for allocation of enough contact time in mainstream schools so as to meet the individual needs of learners with visual impairment. Then periodic in-service training for teachers handling special needs learners is important. (Teacher 1, Rusangu).

To improve the effectiveness of ICT training for visually impaired learners at Rusangu Secondary School, resource personnel recommend that the resource centre acquire additional essential equipment, such as desktop computers and other assistive devices. They shared:

Equipment is very important to acquire. The resource needs to have more important assistive devices like desk top computers and other related devices (Resource Personnel, Rusangu).

The leaners suggest several practical recommendations to improve their ICT learning experience. These include increasing the number of computers and employing more teachers for computer studies to reduce the student-to-computer ratio. Additionally, the provision of headsets, speakers, and visually impaired-friendly devices would create a more inclusive learning environment, enabling visually impaired leaners to acquire ICT skills more effectively.

We need more computers and headsets (R1: Leaner Rusangu Sec School).

We also need more teachers for computer studies and speakers for visually impaired students (R3: Leaner Rusangu Sec School).

CHAPTER FIVE

DISCUSSION OF FINDINGS

5.0 Introduction

This chapter presents the discussion of findings according the research objectives. It also discusses the areas for improvement in ICT education for visually impaired learners.

5.1 Ways Learners with Visual Impairment Learn ICT

The findings from this study reveal different approaches to learning ICT skills among visually impaired learners across different schools. The experiences and outcomes vary significantly based on the availability of resources, the structure of the curriculum, and personal efforts put in by learners. These findings align with existing literature, which suggests that effective ICT learning for visually impaired students is influenced by a combination of structured teaching methods, access to appropriate technologies, and learner engagement. A study by Mnyanyi et al. (2023) emphasized the importance of well-organized ICT curricula that introduce foundational skills systematically before advancing to more complex tasks. This progressive learning structure, seen at St. Mulumba, where students start with theoretical lessons followed by hands-on practice, helps build a strong base before tackling tasks such as online navigation or file management. This structured approach supports cognitive flexibility theory, which posits that learners are better equipped to adapt and apply knowledge when learning progresses in a systematic manner (Kisanga et al, 2020).

Further, the pivotal role of assistive technologies like JAWS (Job Access With Speech), as highlighted by the experiences at St. Mulumba, is consistent with findings from Keitany et al. (2020), who noted that screen readers significantly enhance the ability of visually impaired students to engage with digital content independently. These technologies not only enable basic tasks such as navigating websites and transferring files but also broaden learners' exposure to the modern technological tools that are increasingly integral to both education and future employment opportunities. The availability of such resources, as evidenced in the experiences shared by students at St. Mulumba, confirms the critical importance of access to assistive technologies in empowering students with visual impairments.

Moreover, the experiences at St. Mulumba resonate with literature regarding the importance of resource availability. According to Kisanga et al. (2020), students with access to adequate

assistive technologies perform better academically, highlighting that resource limitations are often a significant barrier in many educational settings for visually impaired learners. The contrast between schools with more robust technological resources, like St. Mulumba, and those with limited access to such resources further underscores the need for investment in assistive tools for visually impaired learners. This finding aligns with Mtonga (2013), who documented that insufficient access to ICT tools in Zambian schools for the blind limits educational opportunities.

Additionally, personal efforts by learners in engaging with ICT tools and independently seeking out learning resources are crucial in determining their success. This reflects findings from Kisanga et al. (2020), who found that self-initiated learning is often a key strategy for overcoming barriers in resource-constrained settings. The experiences at St. Mulumba, where students were able to send documents, navigate the internet, and transfer files to external devices, illustrate how individual perseverance, combined with access to resources, can result in meaningful ICT skills development. This aligns with research by Foley et al. (2014), who noted that students with visual impairments often exhibit high levels of initiative when learning ICT, especially when guided by effective pedagogical frameworks and supported by technology.

Further, the practical outcomes of ICT learning observed at St. Mulumba such as the ability to perform tasks like sending documents, navigating the internet, and transferring files reflect the significant impact of assistive technologies on students' educational outcomes and future opportunities. Studies by Mnyanyi et al. (2023) and Keitany et al. (2020) reinforce this by demonstrating that such skills not only enhance students' educational performance but also their independence and social inclusion. By providing visually impaired learners with the skills to navigate digital platforms and manage digital content, these technologies help bridge the gap between them and their sighted peers, fostering equal opportunities in both education and the job market.

The leaners' ability to grasp hardware components and progressively master software tools like Microsoft Word, Excel, and PowerPoint highlights the benefits of specialized instruction combined with assistive technologies such as JAWS. These findings align with those of Simui et al. (2017), who emphasized the positive impact of assistive technologies like JAWS, voice recorders, and typewriters on the academic success of visually impaired students. Similarly,

Keitany et al. (2020) found that access to personal computers and assistive technologies can enhance concentration and learning for students with visual impairments.

Additionally, the findings on assistive technologies such as JAWS, empower learners to navigate complex digital environments and overcome accessibility barriers. This aligns with the cognitive flexibility theory which acknowledges the importance of effectively using these tools, as learners must adapt to different software interfaces, troubleshoot technical issues, and customize settings to suit their individual needs.

In contrast, the lack of such technologies at Munali Boys, Munali Girls, and Rusangu Secondary School limits the depth of instruction, reducing learners' ability to practice and apply what they have learned. The reliance on sighted students for note-taking at Munali Girls, as well as the lack of hands-on practice at Rusangu Secondary, highlights the exclusionary practices that occur when the needs of visually impaired learners are not adequately addressed. Leaners at these schools struggle with inadequate support and are left to rely solely on theoretical knowledge, which hinders their ability to develop practical ICT skills. The finding is inline with Keitany et al. (2023), who stated that learner have low skills in ICT which affect their academic progress in schools.

This gap between theory and practice contributes to a sense of frustration among learners, as reflected in the comments from leaners at Munali Boys, where the absence of assistive devices limits their ability to operate computers effectively. These findings emphasize the need for a more structured approach to ICT learning, aligning with the findings of Keitany et al. (2020) on the importance of practical engagement for learners with disabilities.

Personal effort emerged as a crucial factor in acquiring ICT skills, with many leaners expressing their determination to practice outside the classroom and seek additional help from teachers when needed. Leaners at St. Mulumba highlighted the importance of self-motivation, practice, and seeking additional support from teachers. Through continuous practice, they were able to discover new skills beyond what was taught in the classroom, such as navigating the internet and transferring files. This aligns with the findings by Kisanga et al. (2020), who identified personal effort strategies, such as self-learning through the internet and alternative devices, as vital coping mechanisms for visually impaired learners in acquiring ICT skills.

In resource-limited schools, learners made similar attempts to enhance their learning, though with limited success due to the lack of assistive devices. For instance, some leaners from Munali Boys and Munali Girls mentioned using computers or phones at home, but without

assistive technologies like JAWS, they struggled to make significant progress. These findings suggests that while personal efforts are critical, they must be supported by the availability of resources and institutional support to maximize their effectiveness. The findings of the study are similar to what Mtonga, (2013) found in his study. He found out that there is inadequate availability of ICT resources which impact the academic performance of the learners.

5.2 Strategies Used to Teach ICT Skills to Learners with Visual Impairment

The findings reveal both the benefits of tailored teaching methods and the challenges posed by inadequate resources and assistive technology. Tailored strategies and assistive technologies play a significant role in enhancing the learning experiences of visually impaired students. Exposing leaners to ICT tools such as computers installed with JAWS helps leaners engage more effectively with the material they are learning. The findings from St. Mulumba, where the curriculum is specifically adapted to the needs of visually impaired learners by employing hands-on approaches such as demonstrations, practical exercises, and interactive sessions, reflect a supportive learning environment. This approach aligns with Negash (2020), who emphasized that learners with visual impairments benefit from collaborative teaching and the use of assistive technologies. The use of screen readers and other assistive tools at St. Mulumba also mirrors the findings of Mnyanyi et al. (2023), which highlight the significant impact of ICT-based assistive technology in enhancing learning outcomes for visually impaired individuals, particularly by empowering them to navigate complex ICT tasks independently.

Further, the findings on tailored instruction as implemented at St. Mulumba, aligns with cognitive flexibility theory principles by providing learners with multiple perspectives on ICT concepts and encouraging them to think critically and creatively. Hands-on activities and interactive sessions foster cognitive flexibility by allowing learners to experiment, make mistakes, and learn from their experiences.

The findings contradicts with Kasebusha et al., (2021), who in their study found that teachers used individual education plans, inclusive education, audio devices, lesson recordings, adapted lessons, high-contrast materials, and magnifiers. These strategies promoted participatory learning, which helped Visually Impaired learners to build self-confidence and retain concepts more effectively.

Despite the success of tailored approaches at schools like St. Mulumba, challenges persist in schools with inadequate resources. At Munali Boys, Munali Girls, and Rusangu Secondary, the absence of screen readers and other assistive tools limits students' exposure to essential ICT skills. This gap in resource availability prevents visually impaired students from fully engaging with ICT learning and achieving outcomes comparable to their peers in better-resourced environments. The fact that teachers and resource personnel often resort to improvisation and theoretical instruction highlights a serious concern. Additionally, the teachers' observations of an unclear and inadequately defined ICT curriculum for visually impaired students underscore a critical information gap regarding the implementation of ICT policies. This issue is exacerbated by the lack of assistive devices in these schools. However, the lack of assistive technologies and inadequate training for teachers also limit learners' opportunities to develop cognitive flexibility. Without access to diverse learning materials and experiences, learners struggle to think critically, problem-solve, and adapt to new situations. The results familiar with what Mtonga (2013) reported in his study. He found limited ICT resources in schools.

The findings suggest that while policy reforms supporting the integration of ICT in education are essential, they are insufficient without the provision of necessary tools and resources. The fafindings are similar to Mtonga (2013) on limitedness of resources in terms of ICT resources. While schools like St. Mulumba offer a supportive environment for visually impaired learners, other schools lack the necessary tools and teaching strategies to provide similar experiences. This highlights the need for a more comprehensive approach to inclusive education, focusing not only on integrating visually impaired students into mainstream classrooms but also on adapting teaching methods and providing necessary resources. The successful implementation of assistive technologies at St. Mulumba demonstrates their potential to empower students and enhance learning outcomes. However, the absence of these resources in other schools significantly hinders the educational progress of visually impaired students.

5.3 Challenges facing visually impaired Learners in Acquisition of ICT Skills

The findings from this study highlight a contrast in the challenges faced by schools in providing ICT skills to learners with visual impairments. St. Mulumba is better equipped compared to the other schools. However, it still faces challenges due to the growing number of leaners, which has not been matched by the expansion or addition of another computer lab. Despite this, the presence of a functional computer lab with computers installed with JAWS software and the

availability of braille embossers make the learning experience at St. Mulumba better than that of the other schools included in this study, such as Rusangu, Munali Girls and Munali Boys.

The presence of ICT facilities such as computers equipped with JAWS software and other assistive devices like speech narrators and braille embossers at St. Mulumba signifies a relatively well-supported environment for visually impaired learners. The findings in which resource personnel at St. Mulumba recognised the importance of teaching ICT skills to learners with visual impairments for their future educational endeavours and independence, is consistent with the findings by Muzata (2020), which emphasized the importance of specialized ICTs in fostering independence and enhancing learning outcomes for students with visual impairments.

The lack of essential assistive technologies like JAWS at Munali Boys, Munali Girls, and Rusangu Secondary creates a dire situation where the acquisition of ICT skills by learners with visual impairments is severely hampered, leading to an unequal learning experience compared to their sighted peers. This is contrary to the provisions of the Education Act of 2021 and the Persons with Disabilities Act of 2012, both of which are non-discriminatory pieces of legislation that explicitly protect the rights of children with disabilities from any form of distinction, exclusion, or restriction in accessing general education on an equal basis with other children without disabilities.

The revelation that some schools not only lack ICT tools but also the human resources needed to attend to the specific needs of learners with disabilities in their acquisition of ICT skills is disheartening. These findings align with those of Keitany et al. (2023) in Kenya, who found that both teachers and learners had low ICT skills, coupled with a lack of ICT resources, which limited opportunities for effective ICT utilization in classrooms. The situation at Munali Girls, where leaners expressed a need for more ICT tools, including phones, reflects the ongoing struggle to provide an equitable learning environment for learners with visual impairments in many Zambian schools. This struggle is echoed in Mtonga's (2013) findings, which highlighted the alarmingly low levels of computer availability in Zambian schools for the blind. The absence of functioning computers with speech programs was identified as a significant barrier to supporting the learning needs of visually impaired students.

The scarcity of assistive technologies and inadequate infrastructure limit learners' ability to experiment with different approaches and problem-solve independently. This constraint hinders the development of cognitive flexibility, as learners are unable to explore diverse

perspectives and generate creative solutions. Further, the noted absence of specialized training for teachers and learners in using assistive technologies and adapting learning materials limits the development of metacognitive skills. Hence, without explicit instruction on self-monitoring, self-evaluation, and self-regulation, learners struggle to identify their strengths and weaknesses and adjust their learning strategies accordingly. The findings are in agreement with what Keitany et al. (2023), who mentioned that due to limited number of ICT in schools, learners with visual impairement find it challenging to learn.

The challenges in acquiring ICT skills are not unique to secondary schools but extend to universities, underscoring the severity of this issue in Zambia. Muzata's (2020) study at the University of Zambia highlighted that despite increased enrollment of students with visual impairments, the lack of investment in specialized ICT tools and computers jeopardizes their ability to fully engage with the university curriculum. The study argued that the neglect not only hinders students' academic progress but also undermines the very purpose of their admission, reducing it to mere rhetoric rather than a genuine commitment to inclusive education.

The findings in this study, where learners with visual impairments relied heavily on their sighted counterparts to access notes, underscore the profound challenges these leaners face in their educational journey. This dependency not only highlights the inequities in access to education but also emphasizes the lack of adequate resources and support systems that should be in place to empower visually impaired learners. These finding mirrors the findings by Kisanga et al., (2020) in Tanzanian, at a higher learning institution, where students demonstrated an over-dependency on sighted peers and readers, which led to low awareness of the potential benefits of assistive technology in enhancing their education. This over-dependency is problematic as it perpetuates a cycle of marginalization, leaving visually impaired students dependent on others for the acquisition of knowledge, thereby limiting their potential for both academic and personal growth.

The revelation that teachers at Munali Boys expressed uncertainty about the existence of a curriculum tailored for visually impaired leaners is deeply concerning, especially considering that this is an inclusive school. Staff at such institutions should be fully informed and well-versed in the inclusive nature of the school and its specific responsibilities toward students with disabilities. This lack of clarity not only undermines the principles of inclusivity that the school is supposed to uphold but also suggests a significant gap in the training and orientation of the

staff. In an inclusive educational environment, it is imperative that all teachers are adequately prepared to meet the diverse needs of their students, particularly those with visual impairments, to ensure equitable access to education.

The revelation that teachers at Munali Boys expressed uncertainty about the existence of a curriculum tailored for visually impaired learners is deeply concerning, particularly in an inclusive school setting. Literature emphasizes the critical role of teacher preparedness in fostering inclusive education. Inclusive education relies heavily on the readiness of educators to support diverse learners. This includes understanding and applying differentiated teaching methods that cater to students with varying abilities and needs. Inadequate awareness or knowledge about inclusive curricula can undermine these principles and hinder the full participation of learners with disabilities (Kisanga et al., 2020).

Moreover, the lack of clarity among staff at Munali Boys highlights a significant gap in teacher training and orientation, which is supported by research on the importance of specialized training for teachers working with students with disabilities (UNESCO, 2017). This aligns with the findings of Bunch and Valeo (2012), who argue that teachers must receive continuous professional development focused on inclusive teaching practices, as this ensures they are equipped to meet the academic and personal needs of students with disabilities. Failure to do so can perpetuate the marginalization of such students and hinder their educational outcomes.

In inclusive settings, it is vital for all staff members to be not only aware of but also well-versed in the responsibilities and strategies required to support learners with disabilities. As emphasized by UNESCO. (2017), inclusive education is not just about enrolling students with disabilities but about providing the necessary support to ensure they thrive academically and socially. Thus, the uncertainty expressed by teachers at Munali Boys about the curriculum raises concerns about the effectiveness of the inclusive education framework and the equitable access to education for visually impaired learners.

Participants in the study also highlighted several areas for improvement in ICT education for visually impaired learners. They noted the need for extending ICT education to senior secondary schools to ensure continuity of learning. This approach allows students to build on their ICT skills progressively throughout their education. Current practices limit ICT instruction to grades eight and nine, which creates a significant gap in the learning process. By extending ICT education, students would have more opportunities to acquire and refine their skills, preparing them better for higher education and future careers. Additionally, increasing

the time allocated for hands-on ICT practice was emphasized as essential for bridging the gap between theoretical knowledge and practical application. Theoretical knowledge alone is insufficient for mastering ICT skills; practical experience is essential. This recommendation is supported by literature, which indicates that students often struggle to apply theoretical concepts without adequate practice (Keitany et al., 2023). Providing more time for practical ICT exercises would bridge this gap, helping students develop a deeper understanding and proficiency in using technology.

Furthermore, integrating ICT training into special education teacher programs was identified as a crucial step. This integration is essential for enhancing the effectiveness of ICT instruction. Improved teaching quality enhances the effectiveness of information delivery, which benefits learners. Teachers who are well-trained in ICT can better support visually impaired students by tailoring their teaching methods to meet specific needs. This approach aligns with best practices in teacher education, which emphasize the need for continuous professional development to keep up with technological advancements.

The recommendation to expand ICT facilities and resources, such as building larger computer labs and acquiring assistive tools, addresses significant infrastructure challenges. Investing in improved facilities and assistive technologies is crucial for creating an inclusive learning environment where all students have access to the necessary tools for ICT education. This approach is supported by research showing that adequate resources are critical for successful learning outcomes (Muzata, 2020).

Recommendations to improve resource availability and ensure curriculum alignment with the needs of visually impaired learners are also noteworthy. Providing more computers, speech devices, and assistive software like JAWS addresses barriers identified in this study. Additionally, ensuring that the ICT curriculum is designed to meet the specific needs of visually impaired students is crucial for effective instruction. Aligning the curriculum with these needs ensures that students receive relevant and practical training, which is essential for their academic and professional success.

CHAPTER SIX

CONCLUSION AND RECOMMENDATIONS

6.1 Conclusions

In conclusion, this study has revealed the significant challenges that visually impaired learners face in acquiring ICT skills due to disparities in resource availability and the inadequacies of current teaching methods. While schools like St. Mulumba have shown that a well-resourced environment can facilitate effective ICT learning through the use of assistive technologies such as JAWS and braille embossers, other institutions, including Munali Boys, Munali Girls, and Rusangu Secondary School, lack the necessary tools and infrastructure to support visually impaired learners. The contrast between these schools underscores the urgent need for a more equitable distribution of resources and the expansion of tailored ICT training programs.

The findings highlight the critical role of assistive technologies in fostering independence and enhancing the learning experiences of visually impaired students. However, the absence of such tools in many schools continues to exacerbate educational inequalities, leaving visually impaired learners reliant on sighted peers and unable to fully engage with ICT education. Furthermore, the uncertainty around specialized curricula for visually impaired learners points to a gap in the implementation of inclusive education policies.

Therefore, there is need for policymakers, educators, and stakeholders to address these curriculum and resource gaps by investing in specialized ICT tools, training teachers in assistive technologies, and expanding ICT education across all levels of schooling. Doing so can ensure that visually impaired learners are not left behind in an increasingly digital world and are given the opportunity to thrive academically and professionally.

6.2 Recommendations

i. **Incorporate Assistive Technologies into National ICT Education Policies**: Governments should mandate the integration of assistive technologies, such as screen readers and braille devices, into national ICT curricula for visually impaired learners. This would ensure equitable access to ICT education across schools.

ii. **Establish Minimum ICT Infrastructure Standards for Special Education Schools**: Governments should set and enforce minimum standards for ICT infrastructure in schools with visually impaired students, including computer labs, specialized software,

and accessibility tools. This would help close the gap in resources and create a conducive learning environment.

iii. **Allocate Dedicated Funding for ICT in Special Education:** There should be a specific budget in the Ministry of Education allocated to support ICT programs for visually impaired learners. This funding could cover the purchase of assistive technology, teacher training, and the development of customized ICT materials.

iv. **Create ICT Teacher Training Programs Focused on Special Needs Education**: The Ministry of Education should develop and implement teacher training programs that focus on the use of assistive technologies and inclusive teaching methods for visually impaired students. This would equip educators with the skills needed to effectively teach ICT to learners with special needs.

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APPENDICES

Appendix A: Focus Group Discussion Guide for learners with Visual Impairments

Title of Research: Acquisition of ICT Skills among Learners with Visual Impairment in Selected Special Schools of Southern and Lusaka Provinces

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1. How is the classroom environment in line with the acquisition of ICT skills?
2. What kind of ICT tools does the school provide?
3. What methods are used to learn ICT skills?
4. At your personal level how are you managing to acquire some of these ICT skills?
5. What are some of the strategies that your teachers are using in teaching you some of these ICT skills?
6. What kind of ICT skills have you been taught?
7. In what ways are the teachers' strategies benefited you?
8. What are some of the challenges that you have been facing when learning these skills.
9. What are some of your recommendations that you would like to be implemented in order for you to acquire these ICT skills?

Appendix B: Interview Guide for Resource Persons

Title of Research: Acquisition of ICT Skills among Learners with Visual Impairment in Selected Special Schools of Southern and Lusaka Provinces

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1. What facilities have been put in place in order to support the acquisition of ICT skills by learners with visual impairment?
2. What methods are being used to teach ICT skills?
3. What type of tools and assistive devices are available for teaching ICT skills to learners with visual impairment?
4. What are some of the activities in relation to ICT that are taking place at resource center to help with acquisition of skills?
5. What are some of the strategies that are been implored by the resource in order to support the acquisition of ICT skills to the learners
6. Explain to me the individual qualities of learners that influence the acquisition of ICT skills?
7. What are some of the challenges that are been faced by the resource when implementing some of these strategies?
8. What are some of your recommendations that you would like in order for the resource to effectively support the acquisition of the ICT skills to the learners?
9. Is there other information you would like to add concerning the acquisition of ICT skills by the learners with visual impairment?

Appendix C: Interview Guide for Teachers

Title of Research: Acquisition of ICT Skills among Learners with Visual Impairment in Selected Special Schools of Southern and Lusaka Provinces

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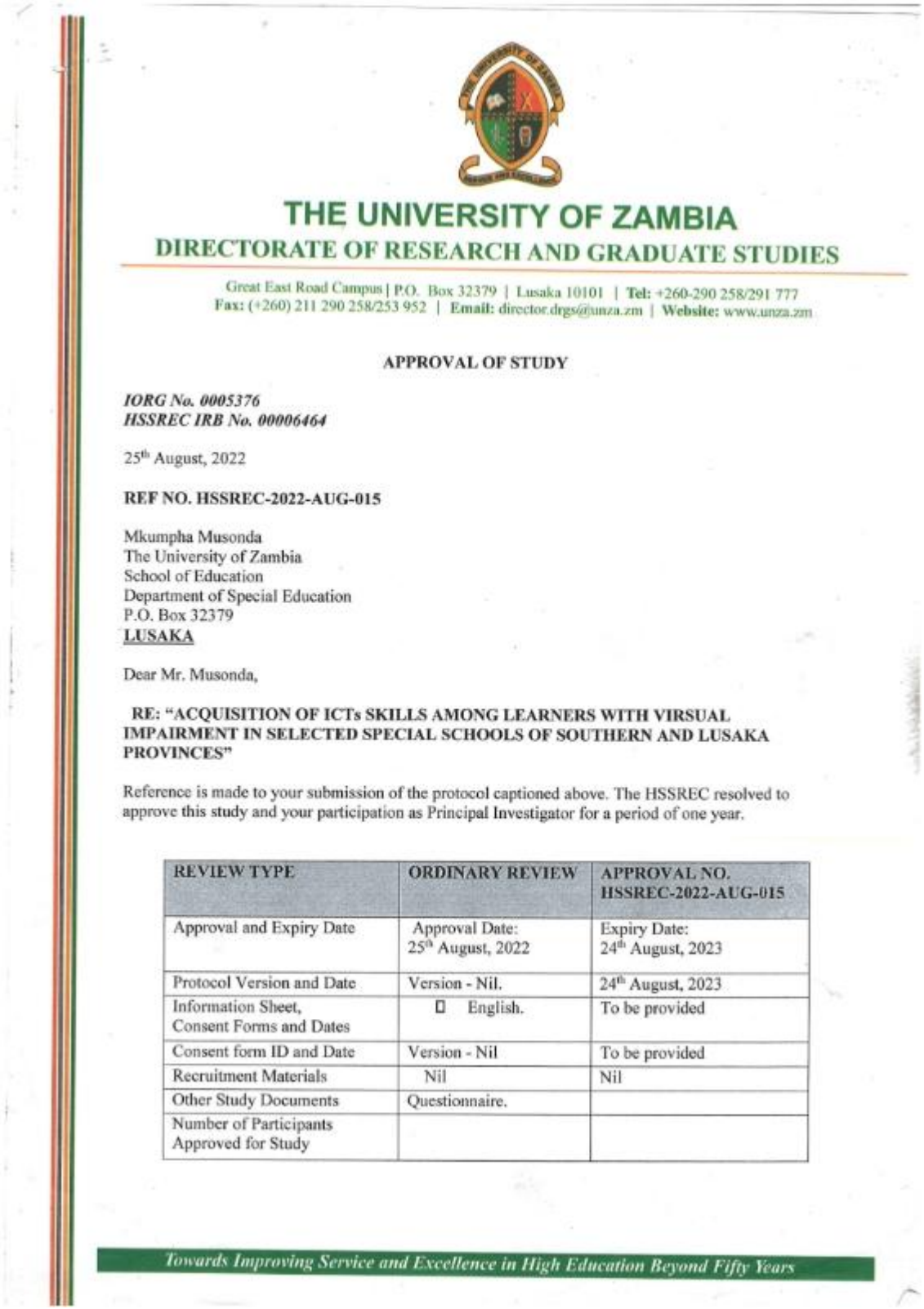
1. What facilities have been put in place in order to support the acquisition of ICT skills by learners with visual impairment?
2. What curriculum do you use to teach ICT skills?
3. What kind of tools are you using to teach these skills?
4. How do you prepare ICT lessons for teaching learners with visual impairment?
5. Explain to me the methods you are using to teach ICT skills to learners with visual impairment?
6. What kind of ICT skills do you teach to learners with visual impairment?
7. What form of training have you undergone to give you skills to teach ICT to learners with visual impairment?
8. What kind of challenges do you face in teaching ICT to learners with visual impairment?
9. What are some of recommendations that you would like to make to improve the teaching of ICT skills to the learners with visual impairment?
10. Is there other information you would like to add concerning the acquisition of ICT skills by the learners with visual impairment?

Appendix D: Ethical Approval Letter



THE UNIVERSITY OF ZAMBIA

DIRECTORATE OF RESEARCH AND GRADUATE STUDIES

Great East Road Campus | P.O. Box 32379 | Lusaka 10101 | **Tel:** +260-290 258/291 777
Fax: (+260) 211 290 258/253 952 | **Email:** director.drgs@unza.zm | **Website:** www.unza.zm

APPROVAL OF STUDY

IORG No. 0005376
HSSREC IRB No. 00006464

25th August, 2022

REF NO. HSSREC-2022-AUG-015

Mkumpha Musonda
The University of Zambia
School of Education
Department of Special Education
P.O. Box 32379
LUSAKA

Dear Mr. Musonda,

RE: "ACQUISITION OF ICTs SKILLS AMONG LEARNERS WITH VIRSUAL IMPAIRMENT IN SELECTED SPECIAL SCHOOLS OF SOUTHERN AND LUSAKA PROVINCES"

Reference is made to your submission of the protocol captioned above. The HSSREC resolved to approve this study and your participation as Principal Investigator for a period of one year.

REVIEW TYPE	ORDINARY REVIEW	APPROVAL NO. HSSREC-2022-AUG-015
Approval and Expiry Date	Approval Date: 25th August, 2022	Expiry Date: 24th August, 2023
Protocol Version and Date	Version - Nil.	24th August, 2023
Information Sheet, Consent Forms and Dates	English.	To be provided
Consent form ID and Date	Version - Nil	To be provided
Recruitment Materials	Nil	Nil
Other Study Documents	Questionnaire.	
Number of Participants Approved for Study		

Towards Improving Service and Excellence in High Education Beyond Fifty Years

Specific conditions will apply to this approval. As Principal Investigator it is your responsibility to ensure that the contents of this letter are adhered to. If these are not adhered to, the approval may be suspended. Should the study be suspended, study sponsors and other regulatory authorities will be informed.

Conditions of Approval

- No participant may be involved in any study procedure prior to the study approval or after the expiration date.
- All unanticipated or Serious Adverse Events (SAEs) must be reported to HSSREC within 5 days.
- All protocol modifications must be approved by HSSREC prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address.
- All protocol deviations must be reported to HSSREC within 5 working days.
- All recruitment materials must be approved by HSSREC prior to being used.
- Principal investigators are responsible for initiating Continuing Review proceedings. HSSREC will only approve a study for a period of 12 months.
- It is the responsibility of the PI to renew his/her ethics approval through a renewal application to HSSREC.
- Where the PI desires to extend the study after expiry of the study period, documents for study extension must be received by HSSREC at least 30 days before the expiry date. This is for the purpose of facilitating the review process. Documents received within 30 days after expiry will be labelled "late submissions" and will incur a penalty fee of K500.00. No study shall be renewed whose documents are submitted for renewal 30 days after expiry of the certificate.
- Every 6 (six) months a progress report form supplied by The University of Zambia Humanities and Social Sciences Research Ethics Committee as an IRB must be filled in and submitted to us. There is a penalty of K500.00 for failure to submit the report.
- When closing a project, the PI is responsible for notifying, in writing or using the Research Ethics and Management Online (REMO), both HSSREC and the National Health Research Authority (NHRA) when ethics certification is no longer required for a project.
- In order to close an approved study, a Closing Report must be submitted in writing or through the REMO system. A Closing Report should be filed when data collection has ended and the study team will no longer be using human participants or animals or secondary data or have any direct or indirect contact with the research participants or animals for the study.
- Filing a closing report (rather than just letting your approval lapse) is important as it assists HSSREC in efficiently tracking and reporting on projects. Note that some funding agencies and sponsors require a notice of closure from the IRB which had approved the study and can only be generated after the Closing Report has been filed.

- A reprint of this letter shall be done at a fee.

- All protocol modifications must be approved by HSSREC by way of an application for an amendment prior to implementation unless they are intended to reduce risk (but must still be reported for approval). Modifications will include any change of investigator/s or site address or methodology and methods. Many modifications entail minimal risk adjustments to a protocol and/or consent form and can be made on an Expedited basis (via the IRB Chair). Some examples are: format changes, correcting spelling errors, adding key personnel, minor changes to questionnaires, recruiting and changes, and so forth. Other, more substantive changes, especially those that may alter the risk-benefit ratio, may require Full Board review. In all cases, except where noted above regarding subject safety, any changes to any protocol document or procedure must first be approved by HSSREC before they can be implemented.

Should you have any questions regarding anything indicated in this letter, please do not hesitate to get in touch with us at the above indicated address.

On behalf of HSSREC, we would like to wish you all the success as you carry out your study.

Yours faithfully,

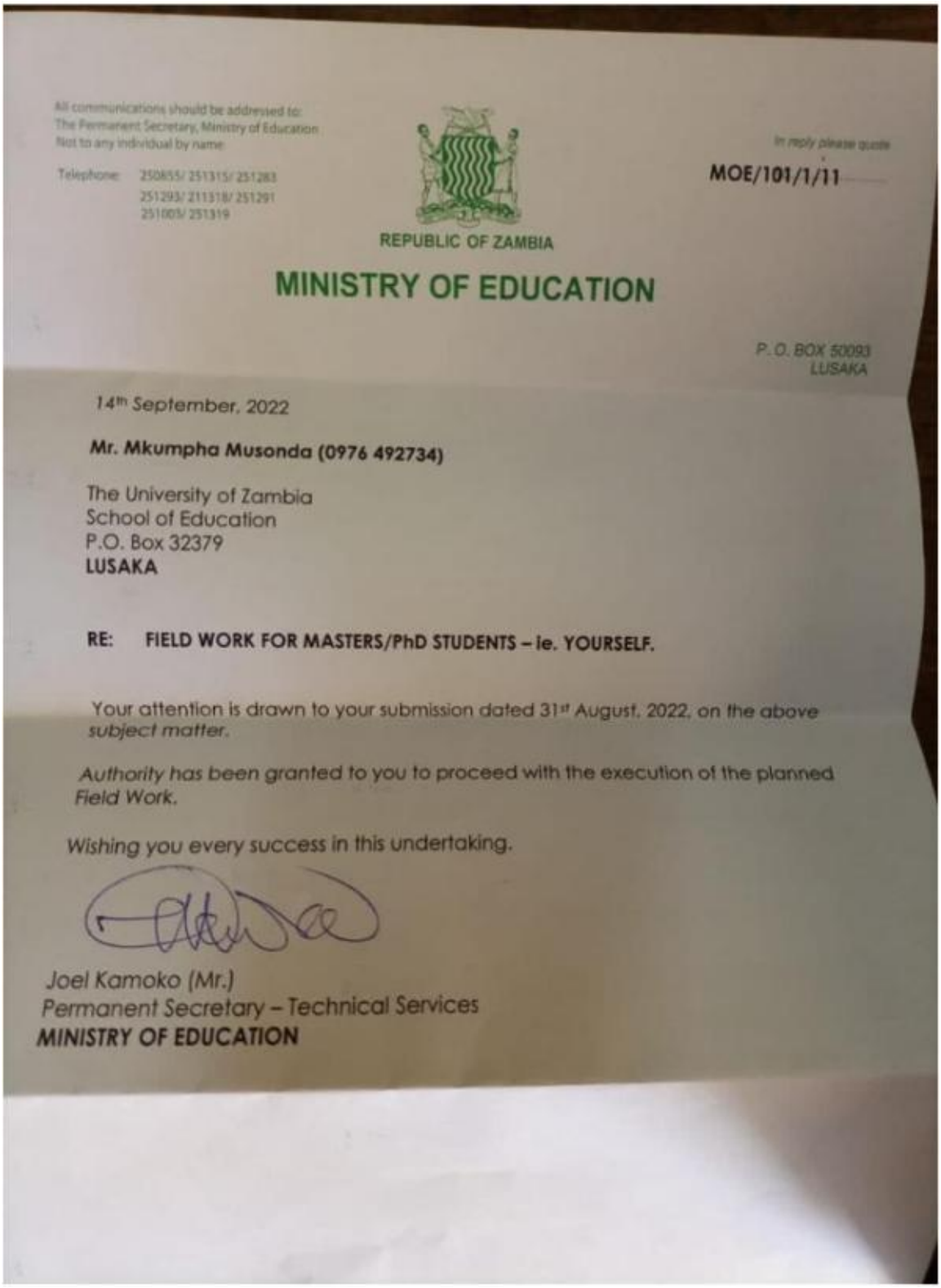
Dr. J. I. Ziwa

DR. J. I. Ziwa

ACTING CHAIRPERSON
THE UNIVERSITY OF ZAMBIA HUMANITIES AND
SOCIAL SCIENCES RESEARCH ETHICS COMMITTEE - IRB

cc: Director, Directorate of Research and Graduate Studies
Assistant Director (Research), Directorate of Research and Graduate Studies
Assistant Registrar (Research), Directorate of Research and Graduate Studies

Appendix E: Ministry of Education Permission to Conduct Research



All communications should be addressed to:
The Permanent Secretary, Ministry of Education
Not to any individual by name

Telephone: 250855/ 251315/ 251283
251293/ 211318/ 251291
251005/ 251319

REPUBLIC OF ZAMBIA

MINISTRY OF EDUCATION

In reply please quote
MOE/101/1/11

P. O. BOX 50093
LUSAKA

14th September, 2022

Mr. Mkumpha Musonda (0976 492734)

The University of Zambia
School of Education
P.O. Box 32379
LUSAKA

RE: FIELD WORK FOR MASTERS/PhD STUDENTS – ie. YOURSELF.

Your attention is drawn to your submission dated 31st August, 2022, on the above subject matter.

Authority has been granted to you to proceed with the execution of the planned Field Work.

Wishing you every success in this undertaking.

Joel Kamoko (Mr.)
Permanent Secretary – Technical Services
MINISTRY OF EDUCATION