

**AVAILABILITY AND UTILIZATION OF ASSISTIVE  
TECHNOLOGY FOR TEACHING AND LEARNING AMONG  
STUDENTS WITH VISUAL IMPAIRMENT: THE CASE OF TWO  
SELECTED PRIMARY SCHOOLS IN DIRE DAWA CITY  
ADMINISTRATION**

**MA THESIS**

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**FBRUARY 2025**

**HARAMAYA UNIVERSITY, HARAMAYA**

**Availability and Utilization of Assistive Technology for Teaching and Learning among Students with Visual Impairment: The Case of Two Selected Primary Schools, Dire Dawa City Administration, Ethiopia**

**A Thesis Submitted to the Department of Special Needs and Inclusive Education, Postgraduate Program Directorate**

**HARAMAYA UNIVERSITY**

**In Partial Fulfilment of the Requirements for the Degree of MASTER OF ARTS IN SPECIAL NEEDS AND INCLUSIVE EDUCATION**

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**February 2025**

**Haramaya University, Haramaya**

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## **DEDICATION**

I dedicate this thesis to my mother, Teybat Nuro, my father, Miftah Seid, my brother, Newab Miftah, and my sister, Bahriya Miftah. Despite their lack of formal education, they have educated me to reach this level and have provided unparalleled support, love, faith, and collaboration. Their partnership has been crucial to my success and shaped me into who I am today.

## STATEMENT OF THE AUTHOR

I hereby declare with my signature below that the thesis entitled “Availability and Utilization of Assistive Technology for Teaching and Learning among Students with Visual Impairment at Selected Primary Schools in Dire Dawa City Administration” has been submitted in partial fulfillment of the requirements for the award of a Master of Arts degree in Special Needs and Inclusive Education at Haramaya University. This thesis has been placed in the university library for borrowers to access in accordance with library regulations. I solemnly declare that this thesis has not been submitted to any other institution for the award of any academic degree, diploma, or certificate. Brief quotations from this thesis are acceptable without specific permission as long as the source is properly and fully cited. Requests for permission to reproduce this manuscript in whole or in part or to quote extensively from it may be granted by the Dean of Postgraduate Studies or the Head of the Department of Special Needs and Inclusive Education if they believe it will advance scholarship. In all other instances, permission must be obtained from the author of the thesis.

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## **BIOGRAPHICAL SKETCH**

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## ACKNOWLEDGEMENTS

Above all, I want to thank the Almighty Allah, who enabled me to complete my studies. My efforts in carrying out this research were not entirely independent. From the proposal to the completion of the work, I would like to sincerely thank Tesema Regassa (PhD), my major adviser, for his guidance, ideas, and counsel. He provided constructive feedback and the assistance I needed most. I would not have been able to finish this work without his careful follow-up.

My co-advisor, Teketel Agafari (PhD), deserves equal recognition for his tremendous work, direction, helpful feedback, and recommendations during my thesis. I greatly benefited from his advice and understanding in writing my thesis. Asmerom Tekle (PhD) and Dawit Negassa (PhD), who reviewed my proposal, are sincerely appreciated for their expert advice and support, which helped me develop this thesis. Their honest contributions, insightful criticism, and effort spent on the research helped me successfully finish my thesis.

Additionally, I would like to convey my sincere gratitude and appreciation to Mr. Shasho Jebena, the department head, for his enthusiasm throughout this research as well as for his exceptional assistance, understanding, guidance, and availability for consultation at all times. You have acted like an elder brother. Besides, I would like to thank my colleagues and the SNIE teachers for their unique teaching support and appreciation. You have worked hard and made sacrifices to reach this MA level and be here. I cannot neglect to express my gratitude for helping my work succeed.

I also want to express my appreciation to all the participants at Sabian Number One and Medhaniale Primary Schools, where the study was conducted, for giving up their time to provide information that made this research possible. I cannot forget to express my thanks to everyone who helped make my work a success.

I would especially like to thank my parents and my family, who always provided me with everything I needed for my education and inspired me to pursue my education. Their prayers, support, encouragement, and contribution to every aspect of my academic endeavors up until the end of my studies. Thank you, I say. I love you all, and may Allah bless you.

## **ABBREVIATIONS AND ACRONYMS**

AT	Assistive Technology
CCTV	Closed-circuit Television
CRPD	Convention on the Rights of Persons with Disabilities
FGD	Focus Group Discussion
GET	General Education Teacher
ICF	International Classification of Functioning, Disability & Health
ICT	Information and Communication Technology
JAWS	Job Access with Speech
NAVD	Non-Video Digital Access
RCC	Resource Center Coordinator
SNE	Special Needs Educator
SWD	Student With Disability
SWVI	Students with Visual Impairment
TAM	Technology Accepted Model
TTS	Text to Speech
UDL	Universal Design for Learning
UNESCO	United Nations Educational, Scientific & Cultural Organization
UNICEF	United Nations International Children's Emergency Fund
WHO	World Health Organization

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# **Availability and Utilization of Assistive Technology for Teaching and Learning among Students with Visual Impairment in Selected Primary Schools in Dire Dawa City Administration**

**Amru Miftah Seid**

## **ABSTRACT**

*The study aimed to explore the availability and utilization of assistive technologies for teaching and learning among students with visual impairments at Sabian Number One and Medhanialeem Primary Schools in Dire Dawa City Administration. Additionally, the study sought to investigate challenges that students with visual impairments face when utilizing assistive technology during the teaching and learning process. The study utilized a qualitative approach through a case study design, involving 18 key informants selected through a purposive sampling technique. This group of participants consisted of 6 students with visual impairments, 4 general education teachers, 2 school principals, 4 special needs educators, and 2 resource center coordinators. The instruments used for collecting data were semi-structured interviews, observations, and focus group discussions. The data was transcribed, coded, categorized, and then analyzed using a thematic analysis technique, and three general themes were generated inductively. The findings of this study showed that the effective utilization of assistive technology has great benefits in enhancing the teaching and learning process and educational experiences of students with visual impairments. Despite recognizing the potential benefits of assistive devices, many students faced challenges in their practical application due to insufficient training and inadequate school support. The findings also revealed several barriers faced by students when the utilization of assistive technology, including limited teaching and learning resources, low understanding and knowledge of assistive technologies among students, inadequate formal training on the use of assistive technologies, and limited skilled teachers. Based on these findings, the study recommended that the schools and the Ministry of Education should collaborate with educational stakeholders such as NGOs, teachers, curriculum designers, and parents to improve efforts in providing adequate and relevant assistive technology and teaching and learning materials for both teachers and students with visual impairments. **Keywords:** Assistive Technologies, availability, utilization, challenges, and students with visual impairment.*

## 1. INTRODUCTION

This chapter discusses the background of the study, the statement of the problem, the research questions, the objectives of the study, the significance of the study, the delimitations and limitations of the study, and operational definitions.

### 1.1. Background of the Study

Vision is a sense that people use to gather information about their surroundings (Madake, Bhatlawande, Solanke, & Shilaskar, 2023). Individuals who have visual impairments may have vision problems from birth or as a result of an injury or incident. According to Madake et al. (2023), assistive technology for individuals with visual impairments includes equipment designed to help them navigate their surroundings, find direction, and assist with tasks both indoors and outdoors. As stated by Maor, Currie, & Drewry (2011), assistive technology refers to devices that assist, adapt, and restore functionality for people with disability to enhance their capabilities.

Assistive technology is defined as tools and services that help students with disabilities maintain, enhance, or expand their abilities (Dell, Newton, & Petroff, 2012). According to the British Educational Communication and Technology Agency (BECTA), assistive technology includes software and technology that support individuals with special needs and disabilities in overcoming additional barriers to learning and communication (Kaulu, 2019). As indicated by Oira (2016), assistive technology provides educators with advanced resources to assist visually impaired students and other special education needs in overcoming obstacles that hinder their teaching and learning process.

As noted by Asebriy, Raghay, & Bencharef (2018), assistive technology significantly improves the quality of life for students with visual impairments in areas such as acquiring knowledge, reading, managing digitized documents, two-way communication, and computerized learning. By utilizing such tools, students with visual impairment or blindness can learn more independently. The study narrated by Erdem (2017) stated that assistive technology includes various tools that support learners with impairments to fully participate in classroom activities. Assistive technologies and software programs used for SwVIs are JAWS, Kurzweil, magnifiers,

voice recognition software, screen magnification, digital talking players, and electronic Braille note-takers (Erdem, 2017). Additionally, research by Lamond and Cunningham (2020) shows that computerized assistive technology can include graphic organizers to help students organize their writing, voice recognition software to translate spoken words into text on a screen, or text-to-speech (TTS) applications that convert printed text to voice. The use of assistive technology enhances the academic achievement of learners with impairments, and for many school-age children, it is their primary source of independence.

However, some obstacles affect the utilization of the program by students with disabilities, including high costs, user reluctance, inadequate accessibility, lack of skills, and other social issues (Bhatt & Kumari, 2015). Alnahdi (2014) claims that the use of assistive technology can help learners with disabilities participate more independently in classroom discussions and handle challenging academic tasks with minimal or no human support. Regarding challenges, research conducted in Nigeria by Babusa & Abdullahi (2022) on the availability and utilization of ATs for students with special needs and in inclusive schools found that the lack of availability of assistive devices and a lack of AT competencies for the utilization of devices.

Tangcharoensathien, V., Witthayapipopsakul, W., Viriyathorn, S., and Patcharanarumol, W (2018) conducted a study focusing on improving access to assistive technologies. The study identified four primary challenges in using and access to assistive devices were found in the study. The first highlighted challenge was a lack of awareness among users. The second challenge was that the identification of assistive technologies did not adequately consider the viewpoint of users. The third issue noted was the lack of funds to purchase assistive technologies, such as glasses, hearing aids, or other low-vision equipment. Finally, the study identified the problem of low-quality assistive devices, which led to ineffective devices.

Jacobsen (2012) conducted a study on assistive technology for students with disabilities. The researcher investigated the tools and challenges faced by teachers in adopting and utilizing assistive resources to meet the requirements of students with disabilities. The study, which used a qualitative technique, discovered that one of the difficulties teachers encountered was a lack of awareness and understanding regarding the adoption and use of assistive technologies. According to the study's findings, instructors' understanding of how to consider, accept, and use

assistive technology and services to meet the requirements of students with disabilities was lacking. This suggests that more training and assistance are required to improve teachers' comprehension of assistive technology and enable them to better meet the device needs of their students with disabilities. At the global level, a study by the American Council on Rural Special Education by Bin Tuwaym & Berry (2018) found that the use of assistive technology in the classroom is a crucial component of educational programs for visually impaired learners. Gronlund and Larsson (2010) conducted a study on the effective use of assistive technology for inclusive education in developing countries, particularly Bangladesh and Tanzania.

The challenges in using assistive technologies in these nations were identified and addressed through a thorough case study. The study identified several challenges, such as negative perceptions and attitudes toward assistive resources, limited access to educational resources, poor maintenance of existing resources, a lack of technical help, and a lack of peer and administrative support. At the African level, research conducted in Ghana by Nyavor & Amaniampong (2020) found that the provision and availability of devices are among the factors that facilitate the utilization of assistive devices in nationally inclusive schools.

A study conducted in Malawi by Jamali-Phiri, Ebuenyi, Smith, Kafumba, & Munthali (2021) found that factors influencing the utilization of assistive technologies among students with disabilities include the atmosphere surrounding the user. Such an atmosphere could be substantiated to comprise external motivation and 'user attitudes. Regarding Ethiopia, a study conducted by Gezie & Dawit (2023) shows that assistive technology can be used in various ways to support students with visual impairments in overcoming certain barriers. For instance, students utilize assistive devices, like screen readers, to access digital materials such as online resources or textbooks, while magnification software enlarges text for easier reading.

The current study was carried out at Sabian and Medhanialem Primary Schools in Dire Dawa city administration. The schools were chosen for their accessibility to relevant information in the field of study. The study aimed to fill a research gap in this specific context and provide insights for future research endeavors. Its purpose was to investigate the availability and use of AT in educational settings for SWVIs at the selected primary schools in the Dire Dawa city administration.

## 1.2. Statement of the Problem

Education is a fundamental right and a powerful tool for social inclusion. However, students with visual impairments face significant challenges in accessing education due to the limited availability and effective utilization of assistive technology in primary schools. Quality education for SWVI remains a major barrier, particularly in resource-constrained settings. Despite the benefits and role of assistive technology in fostering independent learning and academic success for SWVI, several challenges impede its widespread adoption. These challenges include insufficient training and support for educators, a shortage of ATs, and a lack of awareness and understanding of assistive technology.

Additionally, the education of SWVIs, specifically blind students in primary schools, faces significant difficulties, primarily due to a shortage of efficient assistive devices and a lack of knowledge on how to properly utilize these devices. These issues result in barriers to information access and independence. Assistive technologies play a crucial role in enabling SWVIs to overcome barriers to learning by providing accessible resources and fostering independence. Without assistive technology and accessible environments, children with disabilities may be unable to travel from home to school, see what is written on the blackboard, hear and understand the teacher, read textbooks, use sanitation facilities, participate in sports and recreation, and interact with classmates (WHO & UNICEF, 2015).

Currently, in Ethiopia, there have been few studies conducted in the area of assistive technologies. For example, a study by Tenaye (2022) focused on the accessibility and utilization of assistive technologies for the blind in special schools. The study highlighted that blind students face significant limitations in accessing and utilizing assistive technology (AT) due to insufficient resources, inadequate training, and a lack of support and expertise in ICT. Similarly, Gezie & Dawit (2022) conducted a study on the availability, awareness, and utilization of AT among students with visual impairment in higher education. Their finding revealed that a lack of awareness, improper organizational arrangements, and absence of policies negatively impact the availability and use of assistive technologies among SWVIs in higher education.

However, there is a notable gap in understanding how the utilization of ATs can enhance teaching and learning for SWVI in regular primary schools. This includes the challenges related

to the utilization of assistive devices, the types of ATs suitable for SWVIs, and how to effectively utilize them. Previous studies have primarily focused on higher education and special schools, leaving a critical gap in understanding the use of assistive technology in primary schools for students with visual impairments. Therefore, this study aims to fill this gap by investigating the availability and utilization of AT in teaching and learning among students in selected schools in the Dire Dawa city administration, an area that has not been previously studied.

### **1.3. Basic Research Questions**

In order to achieve the objectives of the study, the current study is guided by the following research questions:

1. What types of assistive technologies are currently available and used by students with visual impairments in the selected primary schools?
2. How does the use of assistive technology enhance the teaching and learning of students with visual impairment in the selected primary schools?
3. What challenges do students with visual impairment encounter in using assistive technology in the selected primary schools?

### **1.4. Objectives of the Study**

The study was conducted with the following general and specific objectives:

#### **1.4.1. General objective**

The general objective of the study was to explore the availability and utilization of assistive technology for teaching and learning among students with visual impairment in the selected primary schools in Dire Dawa city administration.

#### **1.4.2. Specific objectives**

To achieve the general objective, the specific objectives of the study were to:

- Identify the types of AT available and used by students with visual impairments in the selected primary schools.

- Clarify the use of AT in enhancing the teaching and learning of students with visual impairments in the selected primary schools.
- Assess the challenges encountered by students with visual impairments in using AT in the selected primary schools.

### **1.5. Significance of the Study**

The study is expected to offer significant benefits to various stakeholders in special needs and inclusive education. Specifically, the Ministry of Education, Science, and Technology can utilize the findings to inform policy-making and curriculum development related to special needs education. This emphasizes the importance of incorporating assistive technology in teaching students with special needs. Teachers can benefit from the study by understanding the advantages of using assistive technology when teaching students with visual impairments.

The study will be greatly beneficial for students as it will show them how to develop themselves independently in order to achieve their educational goals. For the parents, the study will be particularly important as it will emphasize the significance of and how assistive technology devices can be effectively used to enhance their children's education. Additionally, the study will serve as also serve as a solid foundation for other researchers interested in conducting studies on the availability and utilization of assistive technology in teaching and learning among students with visual impairments.

### **1.6. Delimitation of the Study**

The study focused on various key areas within its scope. Geographically, this study differs from earlier studies specifically examining primary schools, Sabian number one primary school, and Medhanialelem in the Dire Dawa city administration. Conceptually, this study was delimited to explore the availability and utilization of assistive technology specifically in the context of teaching and learning among students with visual impairments. It focuses on understanding how such technologies enhance the educational experiences of students and the challenges faced in their utilization. Methodologically, the study utilized a qualitative research approach with a case study design. In terms of participants, the study was delimited to 18 key informants who were

selected using purposive sampling. To represent the demographic characteristics of the participants, School A was used to represent Sabian Number One Primary School and School B for Medhanialem Primary School.

### 1.7. **Limitations of the Study**

One of the major limitations of this research was the difficulty in recruiting participants, especially teachers, to take part in the study. As a result, most participants were busy completing their subject work or preparing for final exams, leading to fewer participants than initially proposed. Additionally, there was reluctance among students to participate in FGDs at the resource center. Another challenge was the relatively small sample size of 18 participants, which may impact the generalizability of the findings. The third significant challenge was scheduling. The researcher needed to dedicate extra time to interviewing SWVIs, as their response required careful elicitation. The interview also presented difficulties, as students had varying lesson times that often interrupted research activities. Since this was a case study was crucial to allocate enough time for thorough interviews and meaningful discussions with participants.

### 1.8. **Operational Definition**

The researcher operationally defined the following key terms for the current study:

**Assistive technologies:** refer to devices designed to enhance the capabilities of students with visual impairments in reading, writing, and interacting with information.

**Availability of assistive technology:** refers to the presence and accessibility of assistive devices and resources within educational settings to support students with visual impairments.

**Utilization of assistive technology:** refers to the active use of assistive devices to assist students with visual impairments in their educational settings.

**Challenges in using assistive technology:** refer to the barriers that hinder the effective use of assistive technology for students with visual impairments in their learning activities in inclusive classroom settings.

**Student's visual impairment:** refers to individuals who are partially or fully blind and have been trained to use assistive devices to access information resources.

## **2. REVIEW OF RELATED LITERATURE**

This chapter focuses on reviewing related literature to explore the availability and utilization of assistive technology in the teaching and learning of students with visual impairments (SwVI). It highlights key areas including the concept and meaning of assistive technology, types of AT, the availability of AT, utilization of AT among SWVIs, challenges faced by students and teacher when using ATs and theoretical frameworks.

### **2.1. Concepts of Assistive Technologies**

The application of structured knowledge and abilities regarding helpful products, including systems and services, is known as assistive technology (WHO, 2022). These technologies help and improve a person with a disability's ability to function independently, thereby promoting their self-esteem and health. According to UNICEF, WHO, and Willings (2015), assistive technology comprises products and related services that help children with impairments function better. These include play and leisure activities, education, family relationships, self-care, mobility, and communication.

The International Classification of Functioning, Disability, and Health (ICF) defines assistive technology and goods as devices, instruments, equipment, or products expressly designed to enhance the abilities of people with disabilities (Ellis, 2016). From the point of view of Bugaj and Norton-Darr (2010), assistive technology (AT) encompasses both assistive technology devices and assistive technology services. AT services are provided to support learners with disabilities in obtaining, arranging, and using assistive technology. Assistive technology devices are equipment, materials, or products that can be locally manufactured, modified from existing products, or purchased commercially. They are used to improve a student's academic limitations (Bugaj & Norton-Darr, 2010).

Assistive technology allows individuals with visual impairments to have the same level of autonomy and independence in their learning and interpersonal interactions as their peers with vision. This enables them to overcome a significant portion of the challenges they face in their daily activities (Alves, Monteiro, Rabello, Gasparetto, and Carvalho, 2009).

A study by Netherton & Deal (2006) defines assistive technology (AT) as any tools or gadgets that individuals with disabilities use to perform specific activities, enhance their functional abilities, and achieve independence.

## **2.2. Types of Assistive Technologies Available and Used by SWVI**

### **2.2.1. The Availability and Accessibility of Assistive Technologies**

This literature review explores the current state of ATs for students with visual impairments, focusing on availability, accessibility, and their impact on educational outcomes.

For students with visual impairments to complete various tasks and develop into effective, self-assured, and independent individuals, assistive technology plays a crucial role in their education. A study by Eliuteri & Lema (2022) in Tanzania aimed to investigate access to assistive devices for students with special education needs. The study utilized a mixed research approach and revealed that while some assistive resources were available for pupils with disabilities, their availability was limited, and users faced difficulties in accessing them. The study provided two recommendations: first, it suggested that assistive resources should be suitable for the users and their environment. Second, the study recommended that assistive devices should be affordable for purchase, acknowledging the financial constraints faced by many individuals and families.

Conducted by Raja (2016), a study focused on bridging the disability divide through the use of digital technology. The study found that there were open-source software packages as well as commercial software available that provide quality alternatives to high-priced assistive technology software. One example of software mentioned in the study is Non-Video Digital Access (NVDA), an open-source screen reader. The study concluded that the Internet and Information Communication Technology (ICT) play a crucial role in the field of assistive and accessible technology. This technology can serve as an assistive device in various areas, such as education.

The study recommended the need to raise awareness and build the capacity of people with disabilities to utilize these technologies effectively. According to Boucher (2018), various assistive technologies (ATs) can help people who are blind or have partial disabilities access information and communication technology, such as computers, smartphones, televisions, and

the Internet. These resources help students with disabilities overcome barriers and actively participate in the learning process (Mwantimwa, 2021). Adams and Garcia (2018) suggest that the presence and effective use of ATs are linked to increased participation, engagement, and overall success in educational settings. Iroeze, Chima-James, Agim, & Opara (2018) examined the availability and utilization of information resources and services in special education center libraries in southeast Nigeria. The study's findings revealed that although there were several assistive technologies available for students, they were not fully accessible.

This lack of accessibility was likely attributed to environmental barriers that hindered students from effectively utilizing these resources by students. Furthermore, it was observed that individuals with disabilities were not fully utilizing the available resources. Finally, the study recommended providing assistive technologies that align with the specific needs of pupils with disabilities. Another researcher presented evidence that to enable better access to academic and personal activities, teachers of SWVI are working to enhance their students' usage of assistive technology in the classroom. With the appropriate assistive technology, students with visual impairments can participate in a variety of activities on their own (Loux, 2009).

The study by Oketoobo, Nandi, & Udom (2023) in Tanzania showed that teachers play a crucial role in assessing, evaluating, and implementing educational strategies for SWVIs. Unfortunately, these teachers lack access to ATs to facilitate support for students with visual impairment. Therefore, it is recommended that the government increase funding and enrich curriculum content to support more holistic implementation.

### **2.2.2. Types of assistive technology used by SWVI**

According to studies, there are various types of assistive technology available for students with visual impairment. For example, Hersh & Johnson (2008) state that blind students require screen readers, screen magnifiers, speech-to-text and braille conversion technology, digital tape recorders, computers with screen reading software, braille note takers, braille embossers, refreshable braille displays, word processors, talking watches, talking dictionaries, and screen reader software. Accessing education research on types of assistive technology used by students with visual impairments in classrooms shows a wide range of options available for individuals with varying levels of sight loss.

The Royal National Institute for the Blind (RNIB 2014) lists the following as some of the most crucial assistive technologies used by students with visual impairments: Screen readers, which translate electronic text to speech, are among the most crucial assistive technologies for the blind. Screen magnifiers display content on a larger screen. Text-to-speech (TTS) software translates written text into audio files that can be played on a variety of devices. Speech recognition software enables data entry using voice instead of a mouse or keyboard. Optical character recognition (OCR) software which scans text and transforms the scanned image into an electronic text file.

Large displays are beneficial for people with partial sight, making on-screen reading easier by providing more space on the screen. Closed-circuit televisions (CCTV) are gadgets that enlarge huge printed materials and objects using cameras; Magnifiers are tiny optical instruments used to enlarge text or smaller objects, available with or without light sources. Transcription software and dictation devices enable users to record meetings or take notes that can be later transcribed. Scanners create computer files from images on paper (Mulloy, Gevarter, Hopkins, Sutherland, & Ramdoss, 2014).

In addition, a study by Nguyo (2015) lists the assistive technology that children with visual impairments use as follows: Some of the assistive technology (AT) used by people with visual impairments include both hardware and software products, such as electronic magnifiers, closed-circuit televisions, portable and refreshable Braille displays, digital and electronic data, digital readers, accessible cell phones, and screen readers. There is no question about the capacity of assistive technology (AT) to improve the lives of students with disabilities, regardless of the variety of devices available.

For people with visual disabilities, ATs such as screen readers and magnification software provide access to information and make involvement in many facets of contemporary life possible (Mishra, 2023). Persons with visual impairments can also benefit from assistive technologies by improving the accessibility of electronic materials and tests, improving the quality of student work, expanding employment opportunities, and reducing dependency (Silman, Yaratan & Karanfiller, 2017). Low-tech tools like a particular pen grip, high-tech items like braille displays and computers with specialized software, and more sophisticated products

are all included in this category (Petty, 2012). As to research by Willings (2015), individuals with visual impairments can utilize various types of assistive technology to access print-on-paper and electronic forms, as well as to generate written material. These include low- and medium-technology gadgets for actual learners as well as non-optical low-vision equipment designed specifically for individuals with low vision. According to empirical research, students with visual impairments may need assistive technology that caters to their specific requirements, such as the availability of print, braille, speech, tactile, or any combination of these access modes (Behnke, 2019).

### **2.3. Utilization of AT that Enhances the Teaching and Learning of SWVI**

Based on the reviewed literature, this section discusses the utilization of assistive technologies that enhance the teaching and learning of students with visual impairments. The use of assistive technologies in the classroom is considered one of the most crucial accommodations provided by education agencies. These resources are designed to support teaching and learning effectively. The use of assistive technology in inclusive education is approached with an emphasis on training, practice, and supporting and facilitating learning. With the use of AT, students may have individualized learning experiences and work at their speed and level of proficiency (McNicholl, 2019).

According to Wachiuri (2015), assistive technology can be useful in two ways: to support learning and to overcome challenges. Students who are visually impaired achieve a higher degree of independence by using the right assistive technology to access information and complete tasks effectively. Technology helps people become more literate, provides equal access to necessary knowledge for employment and general information, and simplifies social and community networks (Kelly & Smith, 2011). The United Nations Educational, Scientific, and Cultural Organization (UNESCO, 2008) supports the use of assistive technology by students with visual impairments, stating that technological advancements can help level the playing field for those who are visually impaired.

According to the European Union (2002), electronic information and communication technologies have become a powerful learning tool for students with visual impairments. These technologies provide access to a wide range of resources and information, enabling collaboration in learning environments. For instance, talking calculators, paperless Braille machines, and tape-recorded books and classes are all available to the majority of blind students today (Kiambati, 2015). The utilization of assistive technologies (ATs) for students with disabilities aims to create an effective, efficient, and satisfactory user experience (European Agency for Special Needs and Inclusive Education, 2015).

A study by Viner, Singh, & Shaughnessy (2020) suggested that the effective use of assistive technologies can promote independence and enhance academic performance. However, Isiaku, Abdullahi, and Nweke (2021) identified several barriers to the effective use of assistive technology. These barriers include a lack of availability of assistive technology, a shortage of qualified teachers to teach students with disabilities how to use assistive technology, insufficient time for instructors to plan and collaborate, a lack of technical support from vendors or manufacturers, limited collaboration between the school and the family of students with disabilities, a scarcity of ICT specialists to instruct students with learning disabilities, and a restricted range of training options for students with disabilities.

In order to help students with impairments succeed academically, Isiaku et al. (2021) suggested that they receive adequate training on how to use assistive technology. The government or school administration should choose low-cost assistive technology, and other funding sources should be found for this purpose as well. Adebisi, Liman, & Longpoe (2015) focused on the use of assistive technology in teaching children with learning disabilities. The study aimed to explore the impact of assistive resources on students' access to information, quality of life, learning process, and ability to write and correct texts. The findings revealed that assistive devices and services had several positive effects on the students.

Firstly, assistive technologies made information more accessible to children, improving their access to educational content. Secondly, the accessibility enhanced active participation in the learning process. Thirdly, the use of assistive resources enabled students to write and correct text, positively impacting their writing skills and overall academic performance. The authors

concluded that assistive resources have the potential to significantly improve the lives of children with learning disabilities by removing barriers and addressing learning difficulties. As mentioned by Eligi and Mwantimwa (2017), these devices not only help SwVI communicate and access information, but they also provide them with the opportunity to acquire new skills that will enable them to utilize digitally based resources in the same manner as their sighted peers. As stated by Farooq & Iftikhar (2015), they conducted a study to assess the effectiveness of AT in facilitating learning for students with visual & hearing impairments. The study utilized a descriptive methodology, employing checklists and questionnaires to collect data. The researchers found that the use of assistive technology had several positive effects on students with visual and hearing impairments.

These devices enabled students to see, hear, and understand information in various settings. The study concluded that the use of assistive devices contributes to students becoming more independent learners and achievers. The researchers recommend reducing the cost of assistive devices to make them more affordable for students with disabilities. The study carried out by Dyzel, Oosterom-Calo, Worm, & Sterkenburg (2020) investigated the effects of ATs such as communication tools and adaptive software, finding that they improved students' capacity for social interaction with classmates and teachers, fostering a more inclusive learning environment. Increased self-esteem and confidence in students with impairments have been associated with the integration of assistive technology (Ahmed, 2018).

According to Alves et al. (2009), who aimed to confirm the use of assistive devices, particularly information technology, in the learning environment of individuals with visual impairments based on teachers' opinions, particular computer programs were deemed crucial. Information technology associated with assistive devices improves reading and writing skills, provides equitable access to the outside world, which improves quality of life, and speeds up the learning process. The researchers concluded that while teachers acknowledged the need for facilities and pedagogical support, assistive technology was utilized in educating students with visual impairments. They also highlighted that information technology plays a crucial role in the inclusion process and can promote independence and self-sufficiency among students with visual impairments.

Research conducted by Smith, Goldstein, & Bailey (2018) indicates that students utilize ATs such as screen readers, magnification software, and braille displays to access educational materials and participate in classroom activities. Proper training on the use of assistive technology is crucial for visually impaired students to access their education effectively. Additionally, to improve the quality of life for individuals with impairments and enhance the functionality of their body parts, assistive technologies are also used during the recovery process (Texeira, Rodrigues, Costa, Santos, 2023).

In conclusion, this literature review suggests that assistive technology has significant potential to support SWVIs. However, successful implementation depends on multiple factors, such as availability, teacher attitudes, comprehensive training, time for adaptation, and adequate support from educational assistants. These findings highlight the necessity for systemic changes to guarantee that SWVIs fully benefit from AT in educational settings.

## **2.4. Challenges Faced by Teachers and SWVI in the Utilization of AT**

### **2.4.1. Challenges faced by SWVIs in using assistive technology**

Based on the literature reviewed, this section discusses the challenges faced by students with visual impairment while using assistive technologies.

Students with visual impairments encounter significant challenges, particularly when utilizing assistive technology during the teaching and learning process. The study explored Shanker & Kant's (2021) qualitative study on assistive technologies for individuals with visual impairments, which focused on the barriers to inclusion. The study employed semi-structured interviews for data collection. The study highlighted that the primary barrier is the lack of specific guidelines for the utilization of assistive technology. Shanker & Kant's (2021) study further showed that insufficient resources and a lack of user proficiency hinder the effective utilization of assistive technology.

Morelle (2016) conducted a qualitative study focusing on the challenges encountered by students with visual impairment in mainstream primary schools. The study employed interviews and observation as the data collection methods. The findings of the study demonstrated that despite being physically integrated into the mainstream classes, these students are not fully

involved and, as a result, they face various barriers. Inadequate support and training for teachers, and limited involvement of parents in their children's learning, were identified as contributing factors. Additionally, the teaching methods and resources were not adequately modified for students with visual impairment, and the physical setting of the classrooms and school grounds was not fully accessible to them. The study also revealed a lack of materials and a negative attitude among teachers. Similarly, Kiomoka (2014) focused on children with visual impairments and used a qualitative case study design. Non-participatory observation and semi-structured interviews were used in the study to gather data.

The purpose of the study was to investigate the difficulties faced by these students in terms of learning and engaging in inclusive primary schools. The study found that insufficient teaching and learning materials hampered the academic development of students with visual impairments. Teachers who had received specialized training to assist the students were also in limited supply. Moreover, the physical settings of the schools did not meet the requirements of the visually impaired children. The study also found that parents' and instructors' lack of cooperation significantly hampered the educational experience of visually impaired youngsters. Furthermore, findings showed that stigmatization was very common among SWVIs, which had an adverse influence on their self-esteem and general academic performance.

According to Smith & Johnson (2018), individuals with visual impairment encounter challenges in accessing library resources, such as navigating physical spaces and accessing printed materials. The authors emphasized the importance of implementing assistive technologies to improve accessibility for this user group. One barrier to effectively using assistive technologies for students with visual impairments in learning activities is the lack of accessibility standards. Another challenge is limited availability and affordability; the challenge is the limited availability and high cost of assistive technologies.

Dalton and Sarah (2020) focused on access to assistive technology among students with visual impairments. The study identified several challenges that students with visual impairments encountered when accessing assistive technology. These challenges included a lack of knowledge on how to use assistive resources, a shortage or limited availability of assistive tools, devices that were not customized to suit the environment, a lack of maintenance of assistive

tools, as well as the high costs associated with acquiring assistive devices for students with visual impairments. The study provided recommendations to address the need for satisfactory and sustainable financial assets in assistive tools, emphasizing the importance of providing regular training on accessing and using assistive devices to enhance the abilities of students with visual impairments. Negative attitudes from peers or misconceptions about assistive technologies can affect students' confidence and willingness to participate (Abdul-Majid, Ahmad, and Abdullah, 2019).

A study conducted in Nigeria by Isiaku, Abdullahi, and Nweke (2021) investigating the integration of AT for students with disabilities revealed challenges that hinder its use by students with visual impairments, such as including a lack of resources, a scarcity of trained instructors, and an absence of technical assistance, among others. Ahmad (2015) conducted a study on barriers to using AT in the field of education by gathering data from secondary sources. The study found that ineffective policies and limited support from the government are the main barriers to using AT devices, among others.

A case study by Chaurasia, McClean, Nugent, Cleland, Zhang, Scotney, & Norton (2016) investigated the effect of anxiety on the acceptance and use of ATs and found that 'anxiety' is a significant barrier to the use of ATs. Students with visual impairments lacked the knowledge to use ATs such as braille Perkins machines and computer-assisted technology, which were installed on the computer and affected the students academically (Mulu & Geta, 2023). This reveals that the application of assistive technologies is necessary for academic improvement for students with visual impairments.

#### **2.4.2. Challenges faced by teachers in the utilization of assistive technology**

Teachers face numerous challenges, particularly in using assistive technology in the teaching and learning process. Gronlund, Lim, and Larsson (2010) investigated this issue using a qualitative case study design, gathering data through observation and interviews. The study concentrated on how assistive technology might be utilized to promote inclusive education in underdeveloped countries, particularly Bangladesh and Tanzania. According to the report, teachers typically lack the necessary skills to properly use assistive technology devices and educate students with impairments. Furthermore, the study made clear that, because of a lack of

funding, including assistive technology in inclusive education is frequently seen as an impractical objective in developing countries due to limited resources. According to Mason (2014), there are application and accessibility barriers to AT use, including specific issues that individuals face. These include providing troubleshooting assistance for broken technology, allowing instructors enough time for collaboration and preparation, providing systems for learners to check out technology, and taking a coordinated strategy across the curriculum. Many advanced and specialized assistive technologies are often expensive, making it difficult for schools and students to procure the necessary devices and software (Datta, Bonnet, Gobert, Lourdeaux, & Sauvage, 2018).

A study done in Nigeria by Chukwuemeka and Samaila (2020) found that among the barriers limiting the use of assistive devices in special education schools is the inadequacy of assistive devices. Weerasinghe, Fonseka, Dharmaratne, Jayatilake, and Gielen (2015) conducted a study on barriers to using assistive devices; there is limited knowledge of using modern technology. A study conducted by Hughes, Burridge, Demain, Ellis-Hill, Meagher, Tedesco-Triccas, and Swain (2014) investigated people's perceptions of barriers and opportunities related to assistive technology. The study revealed a lack of knowledge about AT, awareness of its benefits, and an inadequate understanding of how to use it.

Similarly, a study conducted in the United Arab Emirates by Almekhalifi and Tibi (2012) found a lack of technological knowledge and skill in using AT among people with special needs. As stated by Tangcharoensathien, Witthayapipopsakul, Viriyathorn, and Patcharanarumol (2018), a study was conducted on improving access to ATs in low- and middle-income countries. The study identified four main challenges associated with accessing and using assistive resources in these contexts. These challenges included the lack of awareness among beneficiaries, insufficient user perspective in the design of assistive technologies, and the inability to obtain assistive technologies, such as spectacles or other low-vision devices.

Lastly, the study highlighted the problem of low-quality assistive devices, leading to ineffective outcomes. The study also identified various solutions, including the establishment of a national policy for assistive devices, the need for product development that prioritizes affordability, and the provision of in-service training for people with disabilities. The study recommended that

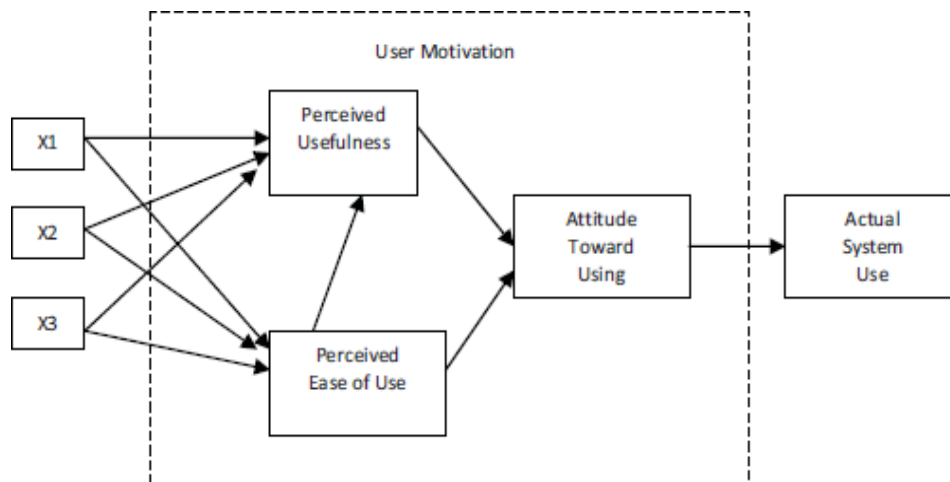
governments in developing countries implement a systematic approach to address these challenges. This approach should involve addressing management challenges such as establishing and maintaining professional networks, retaining knowledge and expertise, effectively managing funding, promoting coordination among ministries, and ensuring the application, maintenance, and monitoring of a national program.

## 2.5. Theoretical Framework

A theoretical framework is an organized collection of ideas and concepts that support research, data analysis, phenomenon explanation, and conclusion drafting (Smith & Osman, 2023). This study was guided by the Technology Acceptance Model (TAM) and the Universal Design for Learning (UDL) model.

### 2.5.1. Technology acceptance model (TAM) theory

The technology-accepted model, introduced by Fred Davies in 1986, aims to explain user behavior regarding technology acceptance and use (Cano, Santiago, & Ruiz, 2024). TAM is a theoretical framework that describes how users accept and utilize technology based on their perceptions of its usefulness and ease of use. To develop the model, Davies first drew on a number of earlier studies, including Fishbein and Ajzen's (1975) work on the Theory of Reasoned Action. He then developed the model depicted in Figure 1.1.



**Figure 1 Technology Acceptance Model; Source from Chuttur (2009) referencing Davies (1986:24).**

The model encompasses five core constructs: perceived ease of use, perceived usefulness, attitude towards using the system, behavioral intention, and actual use. According to this model, users are motivated to utilize the system for three reasons: perceived usefulness, perceived ease of use, and attitude toward utilizing the system, which can explain users' willingness to operate it (Davies, 1989). Davies emphasized that a crucial factor in determining whether a user will embrace or reject the system is their attitude toward utilizing it. Perceived usefulness and perceived ease of use were identified as the two main beliefs that influenced the user's attitude (Chuttur, 2009).

The degree to which a person feels that utilizing technology will be smooth and require little effort is known as perceived ease of use (Dholakia and Dholakia, 2004). The degree to which a person believes that using technology would improve their performance is known as perceived usefulness (Dholakia & Dholakia, 2004). The strengths of TAM derive from its simplicity and power in predicting user acceptance of technology (Anggraeni, 2024). However, TAM has been criticized for its focus on individual beliefs and attitudes, potentially neglecting contextual and social factors that influence technology acceptance in real-world scenarios (Mukred, Asma'Mokhtar, Hawash, AL Salman, & Zohaib, 2024).

Its application in education has demonstrated success in explaining attitudes, intentions, and behaviors related to technology usage, as well as assessing factors that may influence technology acceptance in real-world settings (Siyam, 2019). The application of TAM in this context can effectively advance the understanding of assistive technologies' acceptance among learners with visual impairments. TAM is the more suitable and appropriate tool for employing in a study that serves to fill this gap, seeking to investigate user behavior, design user-friendly technologies, and develop strategies to promote technology acceptance and usage of assistive technology among students with visual impairment.

### **2.5.2. Universal design for learning (UDL) theory**

Universal Design for Learning was proposed by Davies, Rose, and Anne Meyer in the 1990s and addresses learner variability while promoting inclusive education practices (Zhang, Carter Jr, Greene, & Bernacki, 2024). UDL is an educational framework aimed at providing all students with equal opportunities to learn by offering multiple means of representation, expression, and

engagement (Bray, Devitt, Banks, Sanchez Fuentes, Sandoval, & Terrenzio, 2024). UDL's strengths lie in its emphasis on flexibility and customization in teaching methods, materials, and assessments, facilitating accessibility and inclusiveness by accommodating various learning styles, preferences, and abilities (Sala-Bars, Mumbardó-Adam, & Adam-Alcocer, 2024).

Gordon, Meyer, and Rose (2016) identified three primary principles guiding UDL. These include (1) multiple means of representation: offering information in various formats, such as text, audio, and visual aids to enable learners to access and comprehend it through various modalities; (2) multiple means of action and expression: providing students with diverse ways to show their understanding and express themselves (such as written classwork and assignments, oral presentations, and multimedia projects) based on their strengths and preferences; and (3) multiple means of engagement, promoting learners' motivation, interest, and engagement in the learning process by giving options, personalizing learning opportunities, and limiting barriers.

The UDL framework focuses on breaking down challenges and advancing fairness in education while acknowledging that every learner has different skills, problems, and histories (Quirke & McCarthy, 2020). To successfully serve different learners, its concepts have been incorporated into legislation, curriculum creation, teacher preparation, and educational technology design (Arekkuzhiyil, 2022). Applying UDL principles to this study involves examining how assistive technology in the context of two selected primary schools provides various requirements and preferences of learners with visual impairment.

This includes ensuring that the utilization of AT is designed with numerous modes of representation, action, and expression to accommodate various learning preferences. For example, students with visual impairments may use assistive technology such as Braille embossers, note takers, audiology, and speech recognition software to engage in hands-on activities or complete assignments.

### **3. DESIGN AND METHODOLOGY**

This chapter aims to present the following: a description of the study area, research paradigm, research design, data source, target population, sample sizes and sampling techniques, data collection tools, data analysis method, interpretation procedures, ethical considerations, and validity and reliability with qualitative research. As stated in the title, the focus is on the availability and utilization of ATs in teaching and learning among SWVIs in the selected primary schools in the Dire Dawa city administration.

#### **3.1. Description of the Study Area**

This study was conducted in two primary schools, namely Sabiyan Number One and Medhanialem Primary School, located in the Dire Dawa city administration. This section was made considering the availability of personnel and resource materials. Dire Dawa city administration is situated in the eastern part of the country, approximately 516 km away from Addis Ababa. Sabiyan Primary School is a large public school located in the center of the Dire Dawa city administration, serving a diverse student population from various socio-economic backgrounds. The school has been offering education from grades 1 through 8 since 1991. E.C.

Medhanialem Primary School is also a public school situated near the main road of the Dire Dawa city administration, serving a diverse student population from various socio-economic backgrounds. The school was founded in 1985 E.C. In recent years, the school has extended its curriculum to include grades 9 through 12<sup>th</sup>. The selection of these schools was based on two primary factors. Firstly, among all other primary schools found in the Dire Dawa city administration, these two schools stand out as the best places that accommodate students with visual impairment and practice inclusive education.

Secondly, the schools have supplies of assistive devices and teaching materials compared to other neighborhood schools. Thirdly, the schools were chosen based on their relevance to the main objectives of the study and their significant experience in teaching learners with visual impairment, alongside students without disabilities. Based on the facilities, technology resources, and supportive staff for students with disabilities, Sabian Number One Primary

School is a better option than Medhanialem Primary School. The school has greater experience working with students with special needs than Medhanialem Primary School.

### **3.2. Research Paradigm**

The current study employed a constructivist paradigm, which suggests that meanings and knowledge are constructed through shared experiences and social interactions. Instead of condensing meanings into a few categories or concepts, the researcher examined the various perspectives of participants on the being studied (Creswell, 2014). Constructivism is based on three assumptions: (1) humans generate meanings through their interactions with the world, (2) individuals interpret their environment based on historical and social context, and (3) meaning is formed through relationships within a community.

This research paradigm offers a suitable framework for addressing research questions related to the availability and utilization of AT among SWVI in primary schools, focusing on ontology, epistemology, and methodology. From an ontological perspective, reality is shaped by social interactions and experience. The study delves into SwVIs' perceptions and experiences with AT and how their interactions impact its utilization. In terms of epistemology, knowledge is subjective and constructed through shared experiences and social interactions. In the realm of assistive technology, knowledge is not tested or predicted; instead, it is derived from the experiences and interpretations of those who use and engage with the technology.

The study aims to understand the significance of assistive technology from the perspectives of SWVI teachers and other stakeholders. Methodologically, this study utilized a qualitative approach that involved conducting interviews, observations, and FGD to gather in-depth insights into participant experiences and viewpoints.

### **3.3. Research Design**

This study employed a qualitative approach with a case study design. According to Patton (2014), qualitative research involves interviewing individuals to obtain rich, insightful results through engaging conversations. A qualitative case study design is crucial for examining participant data in depth. As noted by Creswell (2014), case studies are a type of inquiry used

in many disciplines, particularly evaluation, where researchers conduct a comprehensive investigation of a case, often a program, process, person, group, or event. The processes, results, and experiences of SWVIs were explored through interviews, FGDs, and observations. These data collection tools allow researchers to obtain more in-depth information. As stated by Yin (2009), a case study is an empirical inquiry that inquires deeply into a current occurrence (the case) within the context of the real world. According to Creswell (2015), conducting a thorough investigation of a bounded system, such as an activity, event, process, or individual based on extensive data collection requires a case study.

### **3.4. Sources of Data**

In this study, the researcher utilized primary sources of data to obtain information about the subject being studied.

#### **3.4.1. Primary Data**

The primary sources of data include the school principals, special needs educators, regular teachers, SWVIs, and resource center coordinators.

### **3.5. Population, Sample Size, and Sampling Techniques**

The target population refers to all the members who meet the particular criteria set for a research investigation (Mohsin Hassan Alvi, 2016). Sampling is a process or technique of selecting a representative part of the population to determine the parameters or characteristics of the entire population (Mohsin Hassan Alvi, 2016). In terms of the school population, Sabian Number One Primary School, which comprises a school principal, 89 teachers (39 males and 51 females), and a total of 2667 students, including 5 SWVIs. Similarly, Medhanialem Primary School comprises a school principal, 36 teachers (13 males and 23 females), and a total of 1177 students, including 3 SWVIs.

The total target participant group for the study consisted of 34 males and 23 females, totaling 57 participants. For this study, the sample included 18 key informants who were purposively selected. Regarding sampling techniques, a purposive sampling technique was used to select participants. According to Johnson & Christensen (2012), purposive sampling makes an effort to choose participants based on specific criteria or standards. A popular method of population

sampling in case study design and qualitative research in general is purposive sampling, which gives participants rich and pertinent data for the study (Gall, Gall & Borg, 2007). The participants were selected based on three criteria. One of these criteria was general education teachers teaching in an inclusive classroom with SWVIs, who are responsible for preparing exams and content, as well as managing the classroom. Therefore, it was crucial to choose teachers who would be teaching a class of children with visual impairments to observe how these students are incorporated into the school's lessons. The second criterion was to have knowledgeable and experienced teachers with a minimum of four years of teaching experience. Researchers believe that these educators had extensive experience working in inclusive classrooms and were fully informed about their students' backgrounds. The third criterion was to have rich information about the status and background of the school, students, and resource availability. The researcher utilized special needs educators who teach, provide training, and monitor daily activities for students; school principals who lead the schools; resource center coordinators who assist students in resource centers; and SWVIs.

**Table 1: Population, Sample Size, and Sampling Techniques**

No.	Participants	Target population			Sample Chosen			Sampling Technique
		M	F	T	M	F	T	
1	SwVIs	5	3	8	4	2	6	Purposive Sampling
2	SN educators	0	4	4	0	4	4	Purposive Sampling
3	GE teacher	27	14	41	2	2	4	Purposive Sampling
4	Principals	2	0	2	2	0	2	Purposive Sampling
5	Resource Center Coordinator	0	2	2	0	2	2	Purposive Sampling
<b>Total</b>		<b>34</b>	<b>23</b>	<b>57</b>	<b>8</b>	<b>10</b>	<b>18</b>	

Table 1 indicates the population, sample size, and sampling techniques used in the study. The target participants were SwVIs, special needs (SN) educators, general education (GE) teachers, principals, and resource center coordinators (RCCs). The sample consisted of 8 males and 10 females, totaling 18 key informants, all selected using purposive sampling techniques. Purposive sampling depends on the researcher's judgment in selecting the individuals, organizations, events, or data points to be analyzed.

### **3.6. Data Collection Instruments**

To employ this research, the researcher made use of three main data collection methods, namely, semi-structured interviews, an observation checklist, and focus group discussions.

#### **3.6.1. Semi-structured interviews**

In this study, semi-structured interviewing was used to collect data from selected participants due to its appropriateness in obtaining in-depth and comprehensive information. An interview involves direct interaction between participants and the researcher, with the interviewer asking questions or verbally to gather responses (Gall et al. 2007). By using probing questions, participants are encouraged to express their thoughts, feelings, ideas, insights, attitudes, and experiences related to the topic under study. Semi-structured interviews are the most popular method for gathering qualitative data as they allow researchers to ensure consistency in the concepts discussed throughout the interview (Corbin, Strauss, & Strauss, 2014).

In this study, interviews were conducted to gather comprehensive information on the availability, utilization, and challenges in using ATs that teachers and students face when teaching and learning in inclusive classrooms. According to Gall et al. (2007), semi-structured interviews involve a combination of closed-ended and open-ended questions to extract valuable insights from participants. For the study, interviews were conducted with a total of twelve participants. This included three special needs educators who provide training and teach in inclusive schools and resource centers in grades 6, 7, and 8 at Sabian Number One Primary School and one SNE who teaches grade 6 at Medhaniallem Primary School. Additionally, two general education teachers who manage classes, head departments, and teach in grades 6 and 7 at Sabian Number One Primary School were included.

Two teachers who teach grades 6, 7, and 8 at Medhaniale Primary School were also a part of the study. The participants also consisted of two RCCs who facilitate students at the resource center and two school principals who lead and facilitate the schools in the two selected primary schools. The interviews aimed to collect detailed information about the availability and utilization of ATs, as well as the challenges faced by teachers and SWVIs at the selected primary schools. Detailed information about the availability and utilization of AT was obtained through open-ended interview questions.

Each interview session lasted between twenty-five to thirty minutes. With the participant's consent, the researcher used a mobile recorder and took notes during the interview to thoroughly capture their responses and minimize the issues associated with note-taking. Confidentiality was assured for all participants before the interviews were conducted. The interviews were done individually and in person to ensure privacy. The researcher translated the interview questions into Amharic and Afan Oromo using Google Translate and language experts to ensure they were easily understood.

### **3.6.2. Observation checklist**

In this study, observation was crucial in understanding the teaching and learning process for SWVIs' inclusive classrooms. To gather meaningful information, an observation method was used in addition to interviews. The researcher used checklists to facilitate observation and purposely selected two primary schools to gather reliable data. An observation checklist was developed to collect data on the availability, current utilization, and challenges faced by students when using AT in the resource center.

Classroom settings were also observed to gather information on the level of student participation during the teaching and learning process. This observation process involved special needs teachers, SWVIs, and resource center coordinators, as well as school principals in the assigned schools. This checklist allows the researcher to engage students and educators in assessing the effectiveness of AT utilization in the learning process. Participants were evaluated based on the availability and usage of AT devices at selected schools. The checklist is also completed by indicating "Yes" or "No" for each observation question.

. Each observation session was scheduled and conducted to ensure thorough data collection.

### **3.6.3. Focus Group Discussion**

In this study, a focus group discussion (FGD) was held with six students with visual impairments. The group consisted of four SWVIs in grades 6, 7, and 8 at Sabian Number One Primary School and two SWVIs in grades 6 and 8 at Medhanialem Primary School. The researcher used audio recording and took notes during the discussions. Similar to interviews, open-ended questions were prepared as discussion guidelines beforehand. One FGD group was held and reported twice, with each session lasting one hour. The researcher used these sessions to gather in-depth insights on the students' accessibility to ATs, their usage of ATs, support practices, and challenges they faced by students during the use of ATs. The FGD questions were designed to obtain versatile data that could not be collected through other data collection instruments.

### **3.7. Credibility, Trustworthiness, and Dependability**

Credibility and trustworthiness were the key factors in this qualitative study. These aspects refer to the accuracy of the results and how well the researcher portrayed the facts of the research participants. Several techniques were used to ensure the credibility of the study, including member checking, peer review, reflexivity-based bias control, and triangulation of data, methods, and theory (Ary, Jacobs & Sorensen, 2010). In this study, member verification and reflexivity were used to ensure the study's credibility employed in this triangulation study approach.

According to Gall et al. (2007), method triangulation involves gathering data using multiple methods in the field. Member checking involved comparing the researcher's recordings with the participants' words or actions during observation, FGD, and interview sessions, respectively (Ary et al., 2010). Data was collected using focus group discussions, interviews, and observations, with a member checking used to validate that observational data accurately reflected the teachers' actions in the classroom and their statements. Continuous reflection on personal bias and thorough data analysis helped maintain neutrality. Special educators reviewed transcripts for conceptual issues, ensuring a complete description of the phenomena for transferability.

The dependability of the interview items was established through discussion with special needs educators in the field. Using direct quotes from participants to describe the findings also contributed to the honesty. Overall, this study employed various techniques to ensure the credibility and trustworthiness of qualitative data and provide a thorough, reliable investigation.

### **3.8. Data Collection Procedures**

Before collecting the data, the researcher first obtained permission and a supportive letter from the department of SNIE. Then the researcher informed the school leader and sampled regular teachers and SWVIs. After that, the researcher sought verbal consent from the study participants before beginning data collection to achieve the purpose of the study. When consent was obtained, the activities of collecting data started with observation, semi-structured interviews, and focus group discussions. The researcher followed procedures for data collection, using observation, interviews, and focus group discussion.

The observation process was conducted systematically to ensure accurate and unbiased data collection. The setting, participants, and activities were carefully chosen to align with the research objectives. The researcher used both participant and non-participant observation techniques, depending on the context. To ensure credibility, the researcher cross-checked observations with other data collection tools such as interviews and FGDs to ensure consistency and alignment. To enhance trustworthiness, the researcher maintained transparency in the researcher's observation methods and recorded detailed field notes. Throughout the process, ethical considerations, such as informed consent and confidentiality, were strictly observed.

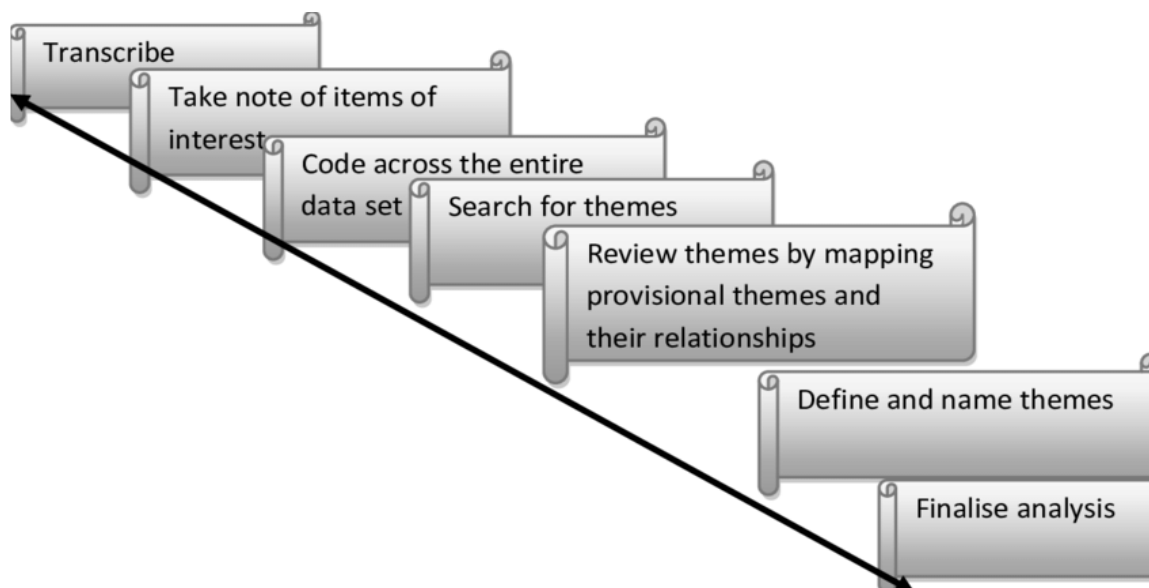
The interview process involved conducting semi-structured interviews with 12 participants, such as teachers, principals, and resource center coordinators. To enhance the credibility, interview questions were carefully designed based on prior research to ensure clarity and relevance. Trustworthiness was ensured by recording interviews with consent and transcribing them verbatim to maintain accuracy. Additionally, member checking was used, where participants reviewed the transcriptions or summaries to confirm the accuracy of their responses. Dependability was strengthened through a systematic coding process to identify consistent themes and patterns. FGD was also conducted with 6 students with visual impairments to capture a range of perspectives and stimulate group interactions on the research topics. A meeting

schedule was established with their permission so they could attend at their convenience. To ensure credibility, FGD was audio recorded with participants' consent and complemented by detailed notes taken during the sessions. Trustworthiness was maintained by triangulating FGD findings with data from interviews and observations. Interviews were conducted in both Amharic and English to ensure clarity and comfort, while group discussions were held in Amharic to allow participants to freely express their ideas and thoughts towards the questions during the interview process. The study's participants were informed about it both directly and through their chosen representatives.

### **3.9. Method of Data Analysis**

After the completion of data collection procedures, the data were then transcribed verbatim, coded, and analyzed using the inductive thematic data analysis method. The process of data analysis involved several steps for analyzing the collected data: (1) Familiarizing with the data (2) arranging and transcribing the data, (3) noting or identifying the items of interest, (4) coding data, (5) searching for themes (6) defining and labeling the themes, and concluding the analysis. Anonymous numbered abbreviations were used for participants during data analysis for identification purposes. Abbreviations: SVI for students with visual impairments, SNE for special needs educators or special needs education teachers, GEt for general education teachers, Pr for principals, and RCC for resource center coordinators.

Ultimately, themes were formed by combining the sub-themes. In terms of data confirmability, participants were presented with emerging trends and asked for feedback on their statements from the interviews to accurately portray their experiences. To ensure that every detail of the interviews was accurately captured in the transcription and properly documented, the data were double-checked. Therefore, data from interviews, observation, and FGDs were thematically analyzed using the methodologies described above.



**Figure 1: Thematic Analysis of the Study (Braun & Clarke, 2006)**

### 3.10. Ethical Considerations

Before commencing this study, the researcher obtained permission from the respective schools through a legal letter issued by Haramaya University's Department of Special Needs and Inclusive Education. Rapport was then established with the participants by discussing the study aims and their rights throughout the research process. The researcher emphasized the significance of obtaining consent from the participants and strictly adhered to ethical research principles while working with selected primary schools in the Dire Dawa city administration. Ethical considerations were prioritized during the study to ensure that participant involvement was entirely voluntary.

Participants were not required to provide their names on the interview questions, and they were assured that their information would only be used for academic purposes. The researcher communicated the study's purpose to the participants, emphasizing that it was conducted solely for academic purposes. The study objectives were outlined in the introduction to the semi-structured interviews, observations, and FGD, ensuring the confidentiality of the subjects. The research proposal ensured that information was provided to the participants at every stage of the research process, and consent was acquired at each step. Participants were routinely checked for their willingness to participate and informed of their right to withdraw from the study at any

time. In presenting the data, the researcher employed codes instead of participant names to address potential ethical concerns and to respect participants' rights. Additionally, all materials utilized for this research were acknowledged, and a copy of the final report was made available to the organization involved if needed. In conclusion, this chapter outlined the research approach and design, specifying the procedure, data-gathering tools, sampling techniques, and target population. It also covered validity and reliability concerns, the steps involved in the data analysis process, and the use of ethical considerations. The tools used to gather data included semi-structured interviews, observations, and FGD within the context of the case study.

## 4. RESULT AND DISCUSSION

The purpose of this section is to present the study's empirical data and conclusions gathered from research participants. The objective of the study was to explore the availability and utilization of AT for learning among teachers and SWVIs. Semi-structured interviews were conducted with twelve participants individually, and one FGD was held with 5 SWVIs, involving a total of 18 key informants. Participant responses are typically presented verbatim and in italics to distinguish them from the overall discussion of other findings.

In addition, it should be noted that additional information and data were collected through observation checklists. Code was used by the researcher to indicate participant's responses. The contents were presented within the framework of the study's objectives. The chapter was organized based on themes derived from the objectives, including types of available and utilized AT, the utilization of AT among SWVIs, and challenges faced by teachers and SWVIs in using assistive technology in the selected primary schools.

### 4.1. Demographic Characteristics of Study Participants

In the Dire Dawa city administration, there are numerous primary schools at both lower and upper-grade levels. Notably, Sabian Number One and Medhanialem Primary Schools are exemplary institutions that prioritize inclusive education by welcoming students with diverse disabilities. Among the diverse groups of SWDs, this study focuses particularly on students with visual impairments. The participants of this study from the two selected schools include four SWVIs, four SN educators, two RCCs, two school principals, and four GETs who were purposively selected based on their information-rich experiences in the study's context.

The selection criteria for participants in the study include (1) direct classroom interaction with those with SWVIs who use ATs, (2) active participation as a student or staff member in activities related to SWD services, and (3) given regular work on service operation and facilitation, making them information-rich due to their roles and engagement. Furthermore, the types of impairments are categorized as low vision and blindness. The researcher used codes instead of the names of participants to adhere to research ethics. Each participant was given individual codes like SVI, SNE, GET, RCC, and Pr.

**Table 2: Demographic characteristics of the participants**

No.	Pseudonym of participants	Sex	Age	Schools (A or B)	Grade Level	Role	Types of impairment
1	SVI1	M	13	B	6	Student	Low vision
2	SVI2	F	14	A	7	Student	Blind
3	SVI3	M	15	A	8	Student	Blind
4	SVI4	M	14	A	8	Student	Low vision
5	SVI5	M	14	B	8	Student	Blind
6	SVI6	F	14	A	6	Student	Blind
5	SNE5	F	31	B	6	Teaching	
6	SNE6	F	27	A	6-7	Teaching, & sign language translator	
7	SNE7	F	33	A	8	Teacher of students with & without disabilities	
8	SNE8	F	29	A	6	Teacher of students with & without disabilities	
9	GEt1	F	27	A	5-6	Teaching & dept. Head	
10	GEt2	F	30	B	6-7	Teaching & dept. Head	
11	GEt3	M	34	B	6-8	Teaching & dept. Head	
12	GEt4	M	32	A	5-7	Teaching & dept. Head	
13	RCC-1	F	34	A		RC facilitator	
14	RCC-2	F	31	B		RC facilitator	
15	Pr1	M	35	A		School leadership	
16	Pr2	M	36	B		School leadership	

Table2: indicates a detailed demographic characteristic of informants were based on the following: gender of the respondent, age of participants, grade level, role of the participants and types of impairment. This offers a clear overview of the diverse characteristics within the study group.

**Table 3: Main themes and subthemes**

Main themes	Sub-themes
Types of assistive technology available and used by SWVIs	<ul style="list-style-type: none"> <li>▪ Use braille assistive devices</li> <li>▪ Ease of use of the available assistive technology</li> <li>▪ Access and use of assistive technology</li> </ul>
Utilization of assistive technology that enhances the teaching and learning of SWVI	<ul style="list-style-type: none"> <li>▪ Enhance access to assistive devices</li> <li>▪ Providing training related to the utilization of assistive technology</li> <li>▪ Use of classroom and educational assistants</li> </ul>
Challenges faced by SWVIs when using assistive technology	<ul style="list-style-type: none"> <li>▪ Insufficient assistive technologies, teaching and learning materials</li> <li>▪ Inadequate formal training on the use of assistive technology</li> <li>▪ Low understanding and knowledge of assistive technology</li> <li>▪ Limited skilled teacher</li> </ul>

Table 3 presents the main and subthemes derived from the data analysis of the study on the availability and utilization of assistive technology (AT) among students with visual impairments. The interview findings for each theme are then analyzed in light of existing research. The main themes and subthemes derived from data analysis helped answer the research questions about the availability and utilization of ATs among SWVIs in the selected primary school areas.

#### **4.2. Types of Assistive Technologies Available and Used by SwVIs**

The first objective of the study was to identify the types of ATs available and used by SwVIs in selected primary schools. Participants were asked to specify the number of ATs available in their resource center. They could indicate their choices by stating whether the technology was available or required. To address this study inquiry, data were gathered via interviews and observations as described below.

**Table 4: Types of ATs available and requested**

<b>Schools</b>	<b>Sabian number-one primary school</b>		<b>Medhanialem Primary School</b>	
	<b>Available</b>	<b>Required</b>	<b>Available</b>	<b>Required</b>
<b>Types of ATs used</b>				
Handled voice recorder	3	2	2	3
Braille books	4	1	2	2
Braille embosser	-	2	0	1
Computers	2	1	1	2
Slate & stylus	11	-	7	-
White cane	6	-	3	1
Abacus	3	3	1	2
Spectacles	3	2	3	1

Table 4 demonstrates the types of assistive technology and devices available and requested at two selected schools. This table highlights the current availability of various ATs in both schools and assesses the additional requirements needed to fully support SwVI.

The findings in Table 4 show the types of assistive technologies available and requested at selected primary schools. According to the results, Sabian Number One Primary School has different ATs than Medhanialem Primary School. In addition, the findings show that the assistive technology at Sabian Number One Primary School was available but not sufficient, it was enough and less requested, and highly required and less available at Medhanialem Primary School. Further findings from interviews and observations highlighted the types of low assistive technologies accessible to pupils with visual impairments. Additionally, the findings revealed that a significant number of assistive technologies are not fully available for students in Medhanialem Primary School compared to Sabian Number One Primary School.

#### 4.2.1. Access and use of assistive technology

This sub-theme focuses on the effectiveness and accessibility of assistive technologies for students, considering user-friendliness, complexity, and the level of support available. The most

important factor for educational fulfillment for SwVI is having access to assistive technology (AT). The data from focus group discussions (FGD) and interviews showed that AT's efficacy and easy availability significantly impact the educational experiences of students with visual impairments. Participants demonstrated that different types of assistive technology, such as braille slates and styluses, white canes, audio recorders, and screen reading software, promote and contribute to the learning of students with visual impairment.

One SWVI from FGD confirmed this: “My school gave me a slate, a stylus, and an audio recorder for school. They also provided white canes for those who couldn't afford them” (SVI4, A).

A student with visual impairment shared their thoughts on using AT: “The handheld voice recorder is easy to use. However, the Braille display is hard and slow for me” (SVI2, A).

To support this view, another student shared:

*I use a white cane to help me get around and check my surroundings. I also use a sound recorder to collect information during class when the teacher is teaching. Yet, I have not used a sound recorder and braille since I was in grades five and six. Now I am accustomed to using both a sound recorder and braille. (SVI6, A)*

The researcher concludes from the aforementioned statements that the school does not pay enough attention to providing SwVI with the current ATs they need for their academic endeavors. The WHO's (2019) report, which confirms that people with disabilities in poor nations have extremely limited or no access to AT for a variety of reasons, lends credence to this assertion. According to this study, one of the primary causes is the absence of targeted legislation, inaccessible organizations, experts, and processes that can provide AT to those who could benefit from it. According to Jovanovic et al. (2018), accessibility features and ease of use have a big influence on how well ATs facilitate learning for students with impairments. Complicated devices or those requiring a lot of training can be a barrier, particularly if students lack the support they need.

#### 4.2.2. Using Braille assistive devices

Based on the findings shown in Table 4 above, it appears that there were various ATs available in schools to support pupils with visual impairments. These resources enhance access to information, communication, and learning opportunities. This subtheme explores how students with visual impairments use Braille and other types of assistive technology, such as audio-based tools, tactile devices, and screen readers, for learning and daily tasks. Table 3 shows that the most available assistive technology in Sabian Number One Primary School was different types of computers. This implies that Sabian Number One Primary School has more assistive devices than Medhanialem Primary School. However, the number of Braille note-takers and embossers is just enough in Medhanialem Primary School and slightly more than required in Sabian Number One Primary School.

A student with VI from FGD at Medhanialem Primary School reported that: “In our school, there are not enough materials available in Braille, making it difficult for me to read and complete my exams” (SVI1, B).

Supporting this view, another student added: “I still rely on a reader during examinations and for reading because I am not well-trained in using Braille for reading and completing assignments” (SVI6, B).

Findings from the interview revealed that handheld voice recorders and Braille were required at Medhanialem Primary School, but there was a shortage of these resources. This implies that they lacked an adequate supply of voice recorders and Braille books. Conversely, the Sabian number one primary school had a sufficient number of handled voice recorders and Braille books. Additionally, Table 4 findings revealed that Sabian Number One Primary School had an abundance of resources such as Braille note takers, Braille books, and slate and stylus tools. However, they had fewer screen readers than needed, and there was a shortage of spectacles. In contrast, Medhanialem Primary School had a greater need for resources, but they had even fewer available compared to Sabian Number One Primary School. Teachers in special education discussed the importance of Braille for students who are blind or have low vision.

One SNE from primary school verified that:

*Braille is still a vital tool for many students, and it helps them in reading and writing. Devices such as Braille note-takers are important. However, not all students are proficient in Braille, and some prefer audio-based technologies like screen readers. (SNE6, A)*

According to information obtained from interviews with SNE and RCC, Braille is still essential for certain learners, particularly those who are blind. The interviews also showed that skilled instructors, enough materials and services, and ongoing practice are necessary for effective Braille training. However, Braille education often faces challenges. There are not enough qualified Braille teachers. Braille resources are also limited. Plus, funding for Braille programs is often inadequate.

The results of the FGD showed that Braille enables pupils to read and write, complete assignments properly, and participate in class activities independently. Additionally, it plays a significant role in improving literacy skills such as grammar, punctuation, and spelling, all of which are crucial for success in school. Braille remains essential for certain educational pursuits, particularly in disciplines like science and arithmetic that involve intricate illustrations or complicated notations.

One student with visual impairment expressed this sentiment as follows: “I rarely use Braille for reading books because it allows me to engage with the text in a tactile manner. Most of the time, I use a voice recorder to listen to the instructor's sound” (SVI1, B).

#### **4.2.3. Ease of use of the available ATs**

The use of ATs in learning has seen significant growth in recent years. Fernández-Batanero, Montenegro-Rueda, Fernández-Cerero, & García-Martínez (2022) conducted a systematic review of the study and observed notable changes in the adoption of AT in education. This growth can be attributed to several factors, including advancements in technology, increased awareness of the benefits of AT, and the implementation of inclusive education policies. Klingner, Urbach, Golos, Brownell, & Menon (2010) state that assistive technology (AT) is available to help individuals with disabilities, from cognitive problems to physical impairment.

Results from participant interviews and focus group discussions revealed that the utilization of assistive technologies (ATs) and related services for SWVI highlighted several important points. The RCCs and special needs educators emphasized the significance of ATs in improving the learning experience for SWVIs. Participants stated that ATs provide SwVIs with the necessary resources to access information and fully engage in their education, bridging the gap between them and their sighted peers. One special needs educator stated: “The availability and effective use of assistive devices play a vital role in the teaching and learning process of students with visual impairments. This increases interest in using devices and maximizes their’ confidence and ability” (SNE8, A).

A general education teacher confirmed the following:

*Students lack experience using assistive devices because they have not attended proper training workshops on their application. However, based on my experience and that of my students with visual impairment, this school provides a better environment for them due to the accessible classes, easy-to-follow pathways, and involvement with the school community. (GEt4, A)*

One special needs educator expressed that:

*I use computers and Braille books that are available at school. I have good interactions with students. Furthermore, I have observed students with visual impairments interacting with computers and utilizing devices and resources at the resource center. (SNE3, A)*

During an interview with the resource center coordinator about the benefits of using assistive technology (ATs) and related services for SWVIs, the coordinator mentioned that “Proper utilization of AT and resources provides students with an advantage. This helps remove barriers and ensure equitable learning opportunities” (RCC-1, A).

Additionally, another informant stated, “The availability of assistive devices plays a vital role in the teaching and learning process for SwVIs. This increases a student’s confidence and ability, helping them to compete with others” (SNE8, A).

A general education teacher from School "A" responded as follows:

*I do not have any experience using ATs because I have not attended any training workshops on their application. However, based on my experience and that of my students with visual impairments, I believe that this school provides a better environment for them. The classes are accessible, the pathways are easy to follow, and there is a strong sense of community involvement. (GEt4, A)*

Regarding their knowledge of using assistive technologies, the special needs educators expressed that: “Some teachers have good knowledge and have interacted with assistive technology either during their training or teaching. The rest had very limited knowledge and had never had the opportunity to interact with the ATs” (SNE2, B).

During the interview with the resource center coordinator about the advantage of using assistive technology and related services for students with visual impairments. The coordinator mentioned that: “Yes, the proper utilization of AT and resources gives students with an advantage, removing barriers and ensuring equitable learning opportunities” (RCC-1, A).

### **4.3. Utilization of ATs Enhances the Teaching and Learning of SwVIs**

The second objective of this study was to clarify the use of assistive technology that enhances the teaching and learning for SwVIs in selected primary schools. To address this study inquiry, information collected from interviews and FGDs is described below.

#### **4.3.1. Enhance access to assistive technology devices**

The findings of the interviews showed that assistive technology enables students with visual impairments to carry out tasks such as taking notes and completing assignments on their own, which they might otherwise require support with. Students gain courage and a sense of independence as a result. Pupils with visual impairments are more equipped to comprehend and participate in the teaching and learning process when they have the opportunity to utilize assistive devices. Students can access and collect information properly with the support of equipment like audio recorders, Braille displays, screen readers, JAWS, and abacuses, which

improves educational performance. The findings also demonstrated that technologies might support students in communicating more effectively with friends, relatives, and instructors. About this, a special needs educator from Medhaniale Primary School narrated: "There are not enough assistive technology devices available, especially the more advanced ones. Furthermore, there is a lack of resources when it comes to providing and accessing assistive technology for all students" (SNE5, B).

The principal of Medhaniale Primary School emphasized the idea further by stating: "Our school only has basic tools such as magnifiers, slates, styluses, and Braille; we lack advanced devices that could greatly benefit students with visual impairments more" (Pr2, B).

One general education teacher verified the following: "Without access to enough AT tools, it becomes challenging to provide tailored learning support for SwVIs" (GEt2, B).

Out of 18 informants, 14 participants agreed that the lack of access and scarcity of assistive devices make it difficult to fully support SwVIs and engage in learning activities more successfully.

#### **4.3.2. Providing training on the utilization of assistive technology**

Providing instructions and training for students on the utilization of devices could make it easier for them to adapt and engage in classroom activities. Regular training could develop new skilled instructors in ATs and how to use them, as well as in planning and assisting with SWVIs. Training for teachers and students on using AT is critical for its effectiveness. Proper training ensures that teachers can confidently instruct students on using AT tools while also learning to navigate and utilize these devices independently. Findings from interviews indicated that, without adequate training, AT can be underutilized or used inefficiently, which could hinder students' learning progress. Once an appropriate assistive technology is selected, the user needs to understand its functions and know how to operate it.

In addition to the student user, training should be provided for those who will work with students with disabilities, including teachers, tutors, and parents. Assistive technology is most successful when both the user and their providers understand the purpose of the technology, are proficient

in operating its relevant features, and have confidence in their ability to use it. During the interview, participants highlighted the importance of training instructors, especially those teaching special education, to create meaningful educational opportunities for children with visual impairment. This finding is supported by Erdem (2017), who asserted that properly trained special education teachers can utilize AT features to meet the needs of all students in their classrooms. Additionally, access to the right resources and trainers supports teachers in becoming more familiar with how technology works (De Witte, Haelermans, & Rogge, 2015).

Special needs educators should have access to ATs and be trained on how to effectively use them so they feel comfortable and confident in using ATs to teach students appropriately. This highlights the importance of training for both teachers and students in the effective use of assistive technology, ensuring that users can fully benefit from these tools. For example, when asked, "Do you have adequate knowledge and skills on how to use assistive technology/devices?" only 3 out of 4 student participants reported limited training on the use of ATs. Thus, only two students had the opportunity to attend training.

The participants who were special needs educators stated: "We need more thorough training sessions. Knowing how to use assistive technology would allow us to better assist students with visual impairment" (SNE6, A & SNE5, B). A student with a visual impairment from FGD expressed: "If we received more guidance and training, we could use devices more effectively". (SVI4, A).

Well-targeted and Well-formulated instruction from teachers during the training provides pre-service teachers with the necessary skills to effectively use technology. Good training should make it possible for pre-service teachers to develop proficiency in AT to help students with disabilities (Saleem, Sajjad, & Rauf, 2019). Providing frequent training helps build confidence in both trainers and students with visual impairments.

Similarly, when asked the question above to the general education teachers, all four participants responded that they had not attended the training. One general education teacher quoted: "Without proper training, it's hard to integrate AT tools naturally into our lessons," reflecting a barrier to effective AT usage in the classroom (GET1, B).

Another participant from Medhaniale Primary School also mentioned, “For me, training is crucial for both teachers and students on how to use such technologies. Furthermore, he added that, without training, it is difficult to teach students with visual impairment in an inclusive classroom” (Pr2, B).

In conclusion, responses from participants, including SN educators, GE teachers, principals, and RCCs, indicate that insufficient training for both teachers and students is a significant barrier to maximizing the potential of assistive technology. They suggest a need for more frequent and practical training opportunities. They added that ongoing training would ensure that users remain proficient and confident in their abilities, thereby maximizing the effectiveness of assistive devices.

#### **4.3.3. Use of classroom and educational assistants**

One important factor that improves the educational experience of students with disabilities, especially those who are visually impaired, is the use of educational and classroom assistants. Classroom and educational assistants play various roles in the classroom, such as creating an inclusive learning environment and providing personalized assistance. The role of educational and classroom assistants is considered vital in promoting inclusive education for students with special needs. Students with visual impairment receive support from classroom assistants. In schools where students with diverse needs are educated together, classroom assistants (CAs) are an essential part of the staff (Zhao, Rose, and Shevlin 2021).

FGD and interview results indicate that when it comes to using AT, classroom and educational assistants can be of tremendous help to SwVIs. Assistants can provide students with specific support in the early stages of learning by helping them solve problems and giving them further guidance. Teachers can concentrate on fundamental classroom management by hiring educational assistants to ensure that all students receive the help they require. Working together can optimize the advantages of AT and support SwVIs in feeling motivated and involved in their studies. Educational assistance can be quite helpful in helping students use technology to assist them and enhance their overall learning process. Due to their specific training and in-depth knowledge of educational programs, education assistants play a critical role in helping students

with a variety of learning needs and skills. One special education teacher from Sabian Number One Primary School expressed their idea in the following manner:

*I believe that by fully utilizing technology for our students, we can enhance their education. Providing them with the best possible opportunities, such as having a classroom assistant who is well-versed in all aspects of technology, will only benefit them. (SNE4, A)*

For students with visual impairments, the lack of access to equal learning opportunities and limited classroom assistance can impact both immediate and long-term results. Concerning this issue, one school principal highlighted the following concern: "The number of available support staff members is limited. It has become much easier to help students with vision impairments and overcome their obstacles when a classroom assistant is present" (Pr1, A).

According to the participant's view, classroom and educational assistance help students enhance their abilities and understanding through professional growth and training. It also helps create a welcoming educational setting where all students can succeed. The role the school plays an important part in a child's life, not only in terms of academic achievement but also in fostering social skills and psychological well-being.

One special education teacher made the following note: "As I understood, classroom assistants are essential because they address each student's needs one-on-one. They also allow teachers to concentrate on teaching while ensuring that students with visual impairments receive the assistance they require" (SNE4, A).

The participants acknowledge the value of this support in managing their responsibilities in the classroom. To strengthen this view, one participant shared the following: "Students with impairments, particularly those with VI, always receive assistance from educational assistants. They also help these stay involved in teaching activities and reinforce their understanding of the materials and devices" (SNE3, A).

The findings supported by Metatla & Cullen (2018) indicate that technological advancements have provided children with visual impairment with new options, but school staff may struggle to navigate the variety of educational resources available to them without the necessary

professional development. People with visual impairments greatly benefit from equal access to education in the long run, as autonomous learning is acknowledged as a crucial aspect of the transition to adulthood (McLinden, Douglas, Cobb, Hewett, & Ravenscroft, 2016).

#### **4.4. Challenges Faced by SwVIs in Using Assistive Technologies**

The third objective of this study was to assess the challenges that SwVIs face when using assistive technologies in selected primary schools. The data were collected through interviews, observations, and FGD as illustrated below.

##### **4.4.1. Insufficient assistive technologies, teaching and learning materials**

The purpose of the study was to determine the challenges that students with visual impairments encounter when using assistive technologies. The data collected from interviews and FGDs revealed that the school lacks sufficient contemporary assistive devices for both teachers and students. For example, it was noted that most students use analog systems rather than digital ones and that the school's assistive technology was inadequate for all of them.

According to reports, students and their teachers are not permitted to take and use those that are provided at school at home; they are only used within the school grounds. This situation was reported by (SVI4-A) as follows: "The school is lacking these devices. We only use the few that we have here at school. Voice recorders and white canes are the only items we are permitted to bring home." Teachers shared the same sentiment, with one stating: "We have a shortage of assistive devices, and teaching resources, especially the modern ones" (SNE7-A).

Interview with the (RCC-1, A). She proclaimed, "We are suffering from the lack of assistive tools, especially modern devices, as most of them are not affordable due to their high cost". Through observation, the study witnessed an embosser and an abacus as new and modern assistive technological devices that are not normally used. The findings of the study demonstrated that most participants, particularly teachers with visual impairments, have widely acknowledged the lack of assistive devices. They stated in their responses that the school lacks teaching and learning resources, particularly Braille books, which are crucial for both teachers and students. They further contended that most of the available books are written in regular

script, making it difficult for teachers with visual impairments to use them when they are preparing for their lessons. Additionally, they mentioned that even the syllabus they use is not in Braille, which forces them to rely on assistance from educational stakeholders, which presents challenges.

One of the (RCC-2, B) responded:

*“We are facing a shortage of teaching and learning materials in Braille format. Unfortunately, even the syllabus we use is not tailored for educators with visual impairment. Recently, our special needs education teacher took training on writing and reading of braille and a new syllabus, but we are still waiting for our turn without any knowledge of when it will occur. Furthermore, there are devices like Braille embosser, abacus, and others that we are unable to utilize, even though they are accessible to some sighted teachers.”*

One special needs teacher stated:

*We have a few devices like magnifiers, audio recorders, and Braille, but they are outdated and not enough for all our students. They also mentioned that these devices do not always meet the needs of every student. (RCC-1, B)*

Another participant added:

*I try to help the students with the resources we have, but it is not always sufficient, especially when we require something more specialized. The participant also acknowledged the limited availability of assistive devices in their classrooms. (SNE6, A)*

The principal indicated that prioritizing funding for assistive technologies is often a challenge. Specifically, the principal mentioned: “We have some funding allocated for AT, but it is not consistently prioritized for assistive technology. It is also used for basic tools, such as white canes, spectacles, Braille, and screen magnifiers” (Pr1, A).

The findings from the FGD with students highlighted inconsistent access to assistive technologies, with some devices being unavailable or in disrepair. The lack of functioning AT negatively impacts students' ability to fully engage in classroom activities and complete

assignments. Students also emphasized the need for more training and support to effectively use the available AT. These insights underscore the importance of ensuring reliable access to well-maintained assistive technologies to support the educational needs of students with visual impairments. During the FGD, one student with visual impairment expressed the following: “Sometimes the devices we require are not available, and we have to wait a long time to get them. This disrupts our learning process” (SVI6, A).

During an interview, a participant from Sabian Number One Primary School expressed:

*I believe the school should purchase more advanced assistive devices. The current assistive devices are not sufficient, even enough in number or variety, to meet the needs of all students with visual impairment. Additionally, the school board should ensure that the resource center is equipped with modern technology. (RCC-2, B)*

Under the same circumstances, the school is also lacks crucial assistive technology that is utilized globally. They suggested replacing their outdated analog systems with more contemporary ones. Students strongly asserted in their replies that they were not allowed to take specific tools home. Braille machines cannot be taken outside of school; only voice recorders and white cane. This restriction prevents students from using these resources efficiently, which impedes their progress and achievements in school.

The study findings are consistent with those of Kawai, (2024), Mbwambo (2025), and Mwakyambiki (2018) who all noted that significant assistive tools are lacking in schools that serve students with visual impairments. The limitations were compounded by the lack of educational materials, which presented significant difficulties for both teaching and learning, ultimately leading to decreased student engagement in classroom activities. Based on these illustrations, the findings showed that despite the government and its partners' efforts in helping and providing assistive devices, the ongoing challenges of lacking such devices and learning resources continue to hinder effective teaching and learning for students with visual impairments. Studies revealed that a lack of assistive devices significantly impacts the teaching and learning process for students with visual impairments.

#### 4.4.2. Inadequate formal training on the use of ATs

The data obtained through interviews and observations highlighted that teachers lacked adequate training in using assistive devices while teaching students. Both regular and special education primary school teachers often go for extended periods without receiving in-service training to enhance their knowledge and skills. As a result, they struggle to effectively support students in utilizing assistive devices. In addition to the lack of training for teachers and students, this serves as a major barrier to the successful integration of assistive technologies in the learning process. Without proper training and guidance on utilizing specific devices, students may not be able to effectively utilize the technology, leading to underutilization of assistive technology.

One of the participants, a special needs educator stated: “The use of assistive technologies will always require the presence of highly trained teachers who can motivate students with visual impairments to properly utilize the available assistive devices during the learning process” (SNE7, A).

Another special education teacher also commented: “As a teacher of students with visual impairment, I have faced and lacked important skills in utilizing the available assistive technologies. This became particularly challenging when conducting instruction during the learning process with our students” (SNE4, A).

A study carried out by Rohaan, Taconis, & Jochems (2009) revealed that technical issues, such as computer malfunctions, slow internet connections, slow internet connections, and outdated computers were significant barriers for instructors. Consequently, the lack of training for instructors is a vital obstacle in itself. Therefore, it is essential to offer training on assistive technologies to enhance their skills and knowledge. The resource center coordinator highlighted the critical need for specialized training for both teachers and students. One RCC had this to say:

*I rarely receive training on the utilization of AT tools. Most of us have learned and understood in a good way, but not enough to support students. Our school lacks a training*

*program regarding training on the way to use devices, and particular training was not provided, which is another barrier for the participants. (RCC-1, A)*

Both principals from the selected schools reflected similar ideas by stating:

*We are encountering pedagogical challenges in finding the appropriate technology for meeting the needs of the students at different levels. Furthermore, we emphasized the importance of providing training for teachers, especially those working with students with visual impairments, to enhance their proficiency in utilizing assistive tools effectively. (Pr1, 2, A & B)*

From the results of the interview, students also revealed that they lack training on how to use and access assistive technologies. For instance, two participants commented that: “As teachers of students with visual impairments, we lack important skills on how to use the current ATs. It becomes a challenge and a barrier when we conduct instruction during the learning process with our students” (SNE5, B & SNE6, A).

Regular teachers often reported a lack of knowledge about AT devices, which made it challenging for them to effectively guide students with visual impairments. One general education teacher shared his idea on the matter: “I have not received much training on how to help students with visual impairments. I do my best I can, but I do not feel confident in utilizing the devices to their maximum potential” (GEt2, B).

These findings are supported by Siu & Morash (2014); they found that many teachers of students with VI had not received any specialized training in AT, and they lacked the basic knowledge and skills required to implement AT in the classroom. The FGD results highlighted several important issues about the shortcomings of formal AT training. According to the students, the training sessions they attended were not enough and infrequent to fully cover all features of the assistive technology. Additionally, several students, mentioned that the trainers themselves were not knowledgeable about the particular ATs, leading to inefficient training sessions that did not meet their needs.

During the FGD, a student with visual impairment revealed that:

*I have not received adequate training. As a result, I often struggle to understand how to properly use the equipment. This makes it difficult for me to fully utilize the available tools. Because of this, it is challenging to make the most of the tools. (SVI4, A)*

Other students with VI from Medhanialem Primary School also said, "I have been given devices, but I do not know how to use them properly. I had to figure it out on my own, and I still don't feel confident using them" (SVI5, B).

As explained, nine out of 18 participants stated that there was insufficient training on the use of ATs due to a lack of internal trainers to provide regular training. Additionally, the participants mentioned that the absence of technical support makes it difficult to ensure that ATs are functioning properly, leading to disruptions in students' learning.

#### **4.4.3. Low understanding and knowledge of assistive technology**

The results obtained from interviews, FGD, and observations revealed that access to assistive technology (AT) may be hampered by a lack of awareness and understanding of AT. Assistive technology enables individuals with impairments to perform tasks that they might not otherwise be able to do. Additionally, AT can make tasks easier or safer. Low awareness, high costs, restricted physical access, procurement difficulties, and sociodemographic barriers are some of the barriers affecting access to assistive technology. According to a study by Nyavor & Amaniampong (2020), technological knowledge is a component of competency and is another factor that influences people to use assistive technology (ATs).

Interview discussions with special education teachers revealed that students often lack the necessary skills to independently use their ATs. One special needs educator noted, "Even if the devices are available, students often don't know how to use them, which limits their potential" (SNE6, A).

A general education teacher highlighted that:

*The challenges of teaching students how to use assistive technology when instructors were not properly trained. Furthermore, he expressed concern about the student's lack of*

*competence in using technology. I have also observed that some students have difficulty operating their devices, which ultimately hinders their participation in class activities. (GEt4, A)*

The findings from the FGD mentioned that SWVI faced difficulties in using and accessing assistive technology due to a lack of knowledge on how to use such devices. Moreover, some staff members are employed to assist students with visual impairments in learning how to use these technologies. One student with a visual impairment shared, “I know the devices can help me, but I don’t understand how to use them properly, and no one has shown me” (SVI4, A).

To support the idea mentioned above, another participant stated, “I have limited knowledge in using devices, especially Braille writing and reading skills” (SVI2, A).

A student with visual impairment from FGD at Medhaniale Primary School reported: “The difficulty I face is a lack of knowledge and skills in using assistive devices. Some students are interested in using devices like Braille note takers, but I lack the knowledge to do so effectively” (SVI5, B).

#### **4.4.4. Limited skilled teacher**

Skilled teachers are very crucial, especially when it comes to teaching students with visual impairments. According to the information gathered from the interviews, most of the participants said that the school's shortage of qualified teachers was an issue. This shortage not only affects the quality of education but also the overall learning environment for students.

This was revealed when one of the teachers stated that:

*We are lacking skilled teachers in our school. This makes it difficult for us to handle gives us all the students in a class of 50 to 60 students because of the workload we have. We have to teach here and then rush to another class on time” (SNE6, A).*

(Pr1, A) had the same views as he argued that: “there is a lack of skilled teachers, especially those who can effectively work with students with visual impairments”

The respondents claimed that there are few teachers, especially those who are skilled in meeting the needs of the student population and their educational needs. Teachers responded by stating that they have a low level of skills when it comes to working with students with visual impairments and that they would need to pursue further education to improve the teaching and learning process. As one of the teachers claimed: “Our level of education in working with students with special needs is low, and if we want to improve it, we have to see training” (GEt3, B).

The study findings indicated that the school is currently experiencing a teacher shortage. According to the results, the school needs more qualified teachers because there aren't nearly as many of them as there are students. It was shown that even teachers with visual impairments lacked the necessary training to instruct pupils with comparable disabilities. They acknowledged that they only teach students with visual impairments because they have the same disability and that they lack the competence to do so. In the same regard, teachers reported that their educational skills working with students with visual impairment are limited.

As a result, due to the limited skilled and well-trained teachers, students with visual impairment are being taught by regular teachers and a few specialized teachers who face numerous barriers in adapting their lessons to meet the needs of each student. These findings align with the studies conducted by Mwakyambiki (2018) and Wilson (2016). The studies highlighted the lack of qualified teachers for students with visual impairments in primary schools. Consequently, it minimizes the inclusion of students with visual impairments in mainstream schools. According to the illustration provided, students with visual impairments face significant challenges in their academic environments, leading to difficulties in the successful implementation of inclusive education.

Various factors including inadequately trained staff have been identified as hampering the learning process in an inclusive environment. These challenges are hindering the effective execution of inclusive education. Kachweka and Rupia (2022) emphasize that this scenario not only complicates teaching and learning for teachers but also presents challenges for students seeking assistance from their teachers, who may lack the necessary training to utilize teaching resources effectively.

## 5. SUMMARY, CONCLUSION, AND IMPLICATIONS

In this chapter summary, the conclusions and implications of the study are presented. Initially, a summary of the study and major findings is presented. After that, the conclusions are drawn based on the major findings. Finally, based on the findings of the study, the implications of the study are forwarded.

### 5.1. Summary

The purpose of this study was to explore the availability and utilization of assistive technology in teaching and learning among students with visual impairments in selected primary schools.

In order to achieve the objectives of the study, the following research questions were posed:

1. What types of ATs are available and utilized by SWVI in teaching and learning in selected primary schools?
2. How does the utilization of AT enhance the teaching and learning of SWVIs in selected primary schools?
3. What challenges do SWVIs encounter in using assistive technology in selected primary schools?

To obtain answers to these research questions and achieve the study's objective, the researcher employed a qualitative approach, using a case study research design. The sampling technique used in this study was purposive sampling based on the participants' knowledge, experience, and rich information. The sample comprised 18 key informants: 4 special needs educators, 2 resource center coordinators, 2 principals, 4 general education teachers, and 6 students with visual impairments, totaling 57 individuals in the target population. Data collection methods included semi-structured interviews and observation checklists. During interviews, the researcher utilized audio recording (mobile recording) and note-taking. The collected data were analyzed using thematic analysis, with themes generated inductively.

The study identified general themes such as the types of assistive technologies available and utilized by students with visual impairments, the utilization of assistive technologies that enhance the teaching and learning of students, and the challenges faced by students with visual impairments when using assistive technologies.

#### **5.1.1. Types of assistive technology available and used by SWVIs**

The information gathered from interviews and observation shows that the types of assistive technology available for SwVI, such as JAWS, braille, handheld audio recorders, spectacles, and abacuses, were accessible and moderately available in both of the chosen schools. However, the majority of assistive technology, including screen magnifiers, TTS software, CCTV, and tactile graphics, has become less readily available. This suggests that SWVI at a particular primary school did not have enough access to assistive technologies.

The findings of the study indicated a disparity in the availability and utilization of assistive devices for SWVIs between Sabian Primary School was found to offer a more comprehensive range of assistive tools and resources compared to Medhanialem Primary School, where significant gaps in necessary technologies were identified. This highlights the urgent need for improved access to assistive technologies to better support the educational needs of students with visual impairments. These findings align with those of Dominic, Joshua, and Eytayo (2020), who also found that a significant number of assistive technologies needed to help children with disabilities are lacking in the majority of special education schools.

#### **5.1.2. Utilization of AT that enhances the teaching and learning among SWVIs**

As obtained from interviews and FGD, the utilization of assistive technologies and devices significantly contributes to the learning of SwVI at selected schools. The study further indicated that effective use of assistive devices increased independence, boosted social interaction with peers, and enhanced the educational experiences of students with visual impairments. The data obtained through interviews indicated that the utilization of assistive devices among students with visual impairments is low. Due to the limited availability of skilled teachers and a lack of training. However, the effective use of assistive devices and resource support closes the gap caused by disability and enhances students' capacities and independence.

This result confirms the findings of Alnahdi (2014), who claimed that the use of assistive technology can help students with disabilities participate more independently in classroom discussions and handle difficult academic tasks with little to no human support. This may improve their sense of independence among several additional advantages.

### 5.1.3. **Challenges faced by SWVI when using assistive technology**

The study highlighted the challenges that students with visual impairment and teachers encounter when using assistive technologies. Data obtained from interviews and FGD with participants in both schools demonstrated low understanding and knowledge of how to use assistive technology, which are major barriers among educators, especially regular teachers, and SwVI. About eleven informants reported facing barriers while using assistive technology due to insufficient assistive technology and limited skilled teachers. Due to limited skilled teachers and training, students may face difficulty using AT such as braille, abacuses, and JAWS.

Additionally, the data collected from FGDs and interviews showed that major barriers in schools and resource centers lie in low understanding and knowledge of the use of assistive technology. Inadequate training on the use of AT among students and teachers is identified as another major barrier. The findings of the study align with those of Juma & Ntulo (2024), a study on the availability and use of assistive technologies by students with visual impairments in primary schools. Findings indicated that students with visual impairments perceived a positive impact of assistive technology on their learning and performance. However, they faced several challenges, including a shortage of assistive devices, insufficient training for both students and educators, a lack of qualified instructors to teach their use, negative attitudes towards ATs, and inadequate quality of available devices.

Contrary to the view presented by Furher (2007), research on the efficacy and effectiveness of assistive technology interventions highlights significant challenges in assessing the outcomes of assistive devices. His findings showed that, despite the potential benefits of assistive technologies, there are substantial methodological and practical barriers to their effective implementation. This perspective contrasts with the more optimistic view that policy improvements alone can improve the use of assistive technologies.

## 5.2. Conclusion

Based on the findings of the study, the following conclusions were drawn:

The study revealed a wide range of assistive technologies mainly available and utilized by students with visual impairments in the selected schools. These technologies include devices such as a voice recorder, Braille, slate and styluses, white canes, spectacles, and computers. This emphasizes the importance of having diverse resource to enhance the accessibility and learning opportunities for these students. These tools are essential in providing access to education and improving the overall quality of life for these students.

The utilization of assistive technologies among students with visual impairments is low, due to limited skilled teachers and a lack of formal training. However, the effective utilization of assistive technologies significantly enhances the learning experiences and independence of students with visual impairments, fostering social interaction and confidence. Therefore, the current underutilization of these devices highlights the need for improved engagement and support to maximize their potential benefits in educational settings.

The study concluded that students with visual impairments face significant challenges in utilizing assistive technology in primary schools. These challenges are insufficient assistive devices and teaching materials, inadequate training for both students and teachers, low understanding and knowledge of the use of assistive technology, and limited skilled teachers. These barriers not only hinder the effective utilization of assistive technologies but also negatively impact the students' learning progress. This highlights the urgent need for improved training and resource allocation in educational settings. Addressing these barriers is important for enhancing educational opportunities and creating a more inclusive learning environment for students with visual impairments and special needs in general.

## 5.3. Implication of the Study

Based on the findings and conclusion of the study on the availability and utilization of assistive technology (AT) in teaching and learning among students with visual impairment in the Sabian Number One Primary School and Medhanialem Primary Schools, the following implications were made:

Students with visual impairments must make appropriate use of assistive technologies. School resource center coordinators and school leaders should work together with key stakeholders in student education and provide necessary assistive devices to improve the teaching and learning experiences of SwVIs. Additionally, schools should focus on both the technological and pedagogical aspects of assistive devices by offering continuous training programs for teachers and students on how to effectively use these devices. The considering body should strive to create a more accessible learning environment and prioritize providing sufficient assistive technology and support services.

Students' educational experiences can be greatly improved by effectively accessing and using ATs, which can enhance their academic performance and independence. Therefore, students with visual impairments should have convenient access to fully equipped resource centers at school equipped with a variety of assistive devices. It is important to prioritize matching the right assistive technology to each student's needs, and recognizing the significance of ATs for educators, students, and the community at large is essential. By addressing the lack of awareness and understanding of ATs, these efforts can enhance their effectiveness and utilization.

Regular and special education teachers, as well as resource center coordinators, should receive training on how to use assistive devices and resources to improve and facilitate the learning process for children with visual impairments. In order for assistive technologies to be used effectively, the government should recruit well-skilled personnel and ensure that teachers are well-trained. This will enhance their confidence and capacity to make efficient use of educational resources.

The main goal of the training programs should be teaching students with visual impairments how to use various assistive devices. Additionally, attention should be paid to raising awareness and pedagogical approaches that include assistive tools in regular teaching procedures, in addition to focusing on the technical aspects of AT utilization. The Ministry of Education and policymakers should guarantee adequate funding for a sufficient amount of assistive technologies for schools.

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## APPENDIXES

### APPENDIX-A

#### HARAMAYA UNIVERSITY

#### COLLEGE OF EDUCATIONAL AND BEHAVIORAL SCIENCES

#### DEPARTMENT OF SPECIAL NEEDS AND INCLUSIVE EDUCATION

#### Interview Questions with Participants

**Dear Participants,**

First of all, I would like to thank you for your willingness to share your time and respond to the following questions. My name is Amru Miftah, and I am a postgraduate student at Haramaya University.

The main purpose of this interview guide is to collect the necessary data for my MA study on the topic entitled **“Availability and Utilization of Assistive Technologies in Learning among Students with Visual Impairment in Selected Primary Schools at Dire Dawa City Administration.”** Your participation is completely voluntary, and you are free to cancel it at any time. I appreciate you spending the time to help me with my academic pursuits. Thus, your genuine and accurate response has paramount importance for the quality of the study. Confidentiality is guaranteed and used solely for research purposes. So please answer the following questions openly and honestly.

Thank you very much for your cooperation!

Sincerely,

Amru Miftah

Date-----Time-----Place-----

No. of participants: Female.....Male.....

## **Appendix 1: Semi-structured interview for special needs educators (SNEs)**

### **Research Question 1: What types of AT are available and used by SwVIs?**

1. What types of ATs are available for SwVIs in your school? How do you ensure that these devices are accessible to the students who need them?
2. What specific types of AT are currently used by students with visual impairment?
3. How do you determine which ATs are most appropriate for students with VI?
4. How do you integrate assistive technologies into your daily teaching practices?

### **Research question 2: Does the utilization of ATs enhance the learning of SwVIs?**

1. How do SWVIs use AT devices in your classroom?
2. How do SWVIs in your class generally respond to using AT devices?
3. What kind of training do you receive to effectively use ATs in your teaching?
4. How can the school support SwVIs on the use of ATs for SwVIs?
5. Can you describe how ATs are incorporated into daily lessons or activities for SwVIs?
6. Do you have adequate knowledge and skills on how to use ATs/devices?

### **Research question 3: What challenges do SwVIs encounter in using AT?**

1. What challenges have you encountered in using AT devices with SwVIs in your class?  
How do you help students overcome these difficulties?
2. Do you experience any challenges when using assistive technologies/devices?
3. Are there specific barriers you believe limit the effective use of ATs for these students, such as training, resources, or support?
4. How do you or your school typically address these challenges to make AT more accessible for SwVIs?

## **Appendix 2: Semi-structured interview for general education teachers (GETs)**

### **Research Question 1: Types of AT available and used by SwVIs?**

1. Which types of ATs are more available and used for SwVIs in your teaching classroom?

2. How do you think the availability and effective utilization of AT can improve the overall learning experiences of SwVIs in mainstream classrooms?

**Research question 2: Does the utilization of ATs enhance the learning of SwVIs?**

1. What is your view on the use of ATs by students with visual impairment?
2. Have you observed any specific improvements or challenges in students' performance due to the use of these devices?
3. Have you received any training on how to use ATs for SwVIs? If so, was it sufficient?

**Research question 3: What challenges do SwVIs encounter in using AT?**

1. What challenges do you observe when students use ATs in your classroom? How do you manage or overcome these challenges?

**Appendix 3: Semi-structured interview for school principals**

**Research Question 1: What types of ATs are available and used by SwVIs?**

1. What types of ATs did your school provide or offer to SwVIs?

**Research question 2: Does the utilization of ATs enhance the learning of SwVIs?**

1. What services or orientation are provided by your school for the proper utilization of assistive devices for SwVIs?
2. What kind of training is provided to teachers for using assistive technology?
3. How do you manage the usage and effectiveness of AT in your school?

**Research question 3: What challenges do SwVIs encounter in using AT?**

1. What are the obstacles that hinder ATs' practice for their SwVIs at your school? How do you try to solve it?
2. What are the main challenges your school faces in providing AT to SwVIs? How do you address these challenges?

## **Appendix 5: Semi-structured interview for resource center coordinators**

### **Research Question 1: Types of ATs are available and used by SwVIs?**

#### **1. What are the types of ATs available in your resource center?**

<b>No.</b>	<b>Items of devices</b>	<b>Available</b>	<b>Required</b>	<b>Not available at all</b>
6	Braille books			
18	slate & stylus			
0	Braille embosser			
5	Handheld voice recorder			
9	White cane			
1	Perkins Braille			
3	Computers			
4	Abacus			
6	Spectacles			

### **Research question 2: Does the utilization of ATs enhance the learning of SwVIs?**

1. How do SWVIs use assistive devices in your center?
2. Are the students using ATs properly? If not, what kinds of measurements have you taken?
3. Would you receive training on how to use ATs in your teaching? If you say yes, is it enough?

### **Research question 3: What challenges do SwVIs encounter in using ATs?**

1. What are the main challenges your resource center faces in providing AT to SwVIs?  
How do you address these challenges?

Thank you for your valuable insights and engagement in this interview discussion!

Sincerely,

Amru Miftah

APPENDIX-B

ሃረማያ ዩኒቨርሲቲ

የትምህርት እና የስነባህሪ ሳይንስ ኮሌጅ

የልዩ ፍላጎትና አካቶ ትምህርት ክፍል

የማየት እክል ላለባቸው/ለይነስውራን ተማሪዎች የተዘጋጁ የቡድን ውይይት ጥያቄዎች/ቃለመጠይቆች።

ውድ ተሳታፊዎች፣

በመጀመሪያ ጊዜዎን ለማካፈል እና ለሚከተሉት ጥያቄዎች ምላሽ ለመስጠት ፈቃደኛ ስለሆናችሁ ለመሰግናችሁ እወዳለሁ። አምሩ ሚፍታህ እባላለሁ በሃረማያ ዩኒቨርሲቲ የድህረ ምረቃ ተማሪ ነኝ። የዚህ የትኩረት ቡድን ውይይት ዋና አላማ በድሬዳዎ ከተማ አስተዳደር በተመረጡ አንደኛ ደረጃ ትምህርት ቤቶች ለአይነስውራን ተማሪዎች ለመማር አጋዥ ቴክኖሎጂዎች አቅርቦትና አጠቃቀም በሚል ርዕስ ላደረኩት የMA ጥናት አስፈላጊ መረጃዎችን መሰብሰብ ነው። የእርስዎን ተሳትፎ ሙሉ በሙሉ በፈቃደኝነት ነው፣ እና በማንኛውም ጊዜ መሰረዝ ይችላሉ። በአካዳሚክ ስራዎቼ እኔን ለመርዳት ጊዜዎን ስለሰጣችሁኝ ለመሰግናችሁ እወዳለሁ። ስለዚህ፣ የእርስዎ እውነተኛ እና ትክክለኛ ምላሽ ለጥናቱ ጥራት ከፍተኛ ጠቀሜታ አለው። ሚስጥራዊነት የተረጋገጠ እና ለምርምር ዓላማዎች ብቻ ጥቅም ላይ ይውላል። ስለዚህ እባክዎን የሚከተሉትን ጥያቄዎች በግልፅ እና በታማኝነት ይመልሱ።

ስለ ትብብርዎ በጣም እናመሰግናለሁ!

ከሰላምታ ጋር

አምሩ ሚፍታህ

ቀን ---- ሰዓት -----ቦታ-----

የተሳታፊዎች ቁጥር:- ሴት ..... ወንድ.....

**አባሪ 1: የእይታ እክል ላለባቸው ተማሪዎች የቡድን ዉይይት ላይ ያቀከሩ መጠይቆች**

**የጥናት ጥያቄ 1: የሚገኙ እና ጥቅም ላይ የዋሉ የአጋዥ ቴክኖሎጂ ዓይነቶች**

1. በአሁኑ ጊዜ ምን ዓይነት አጋዥ ቴክኖሎጂዎች/ መሳሪያዎች ይጠቀማሉ?
2. በትምህርት ቤት ውስጥ ምን ዓይነት የአጋዥ ቴክኖሎጂ/መሳሪያዎች ዓይነቶች ይገኛሉ?
3. ከሚገኙት ረዳት መሳሪያዎች ውስጥ የትኛው ለእርስዎ የበለጠ ጠቃሚ ናቸው?
4. እነዚያን በትምህርት ቤት ውስጥ ያሉትን አጋዥ መሳሪያዎች ሲያገኙ ምን ጥቅም ያገኛሉ?

**የጥናት ጥያቄ 3: የአጋዥ ቴክኖሎጂዎች ወይም መሳሪያዎችህ መገኘት እና አጠቃቀም የአይነስውር ተማሪዎች ትምህርት ያመቻቻል እና ያሻሽላል?**

1. በክፍል ውስጥ የአጋዥ መሳሪያዎችን እንዴት ይጠቀማሉ?
2. የእርስዎን አጋዥ ቴክኖሎጂዎች እንዴት መጠቀም እንደሚችሉ ላይ ምንም ዓይነት ስልጠና ወስደዋል? ከሆነ ጠቃሚ ነበር?
3. አጋዥ ቴክኖሎጂዎችን በመጠቀም አስተማሪዎችዎ እና የክፍል ጓደኞችዎ እንዴት ይደግፋዎታል?

**የጥናት ጥያቄ 4: የማየት አክል ያለባቸው ተማሪዎች የአጋዥ ቴክኖሎጂዎች/መሳሪያዎችን ሲጠቀሙ ምን ተግዳሮቶች ያጋጥሟቸዋል?**

1. አጋዥ መሳሪያዎችን ሲጠቀሙ ምን ችግሮች ያጋጥሙዎታል?
2. በክፍል ውስጥ አጋዥ ቴክኖሎጂዎችን ሲጠቀሙ ምን አይነት ችግሮች ያጋጥሙዎታል? እነዚህን ችግሮች እንዴት ተቋቁማችሁ?
3. አሳይመንት ስትሠሩ፣ ስታነቡ፣ ስትጨወቱ እና ከእኩዮቻችሁ ጋር ስትነጋገሩ የሚያጋጥማችሁ ተግዳሮቶች ልትነግሩኝ ትችላላችሁ?

## APPENDIX-C

**HARAMAYA UNIVERSITY****COLLEGE OF EDUCATIONAL AND BEHAVIORAL SCIENCES****DEPARTMENT OF SPECIAL NEEDS AND INCLUSIVE EDUCATION**

**Availability and Utilization of Assistive Technology in Teaching and Learning among Students with Visual Impairments at the Selected Primary Schools in Dire Dawa City Administration**

**OBSERVATION CHECKLIST**

**This observation checklist will be filled out by the researcher when he visits the schools mentioned in the study based on the following indicators.**

<b>No</b>	<b>Indicators</b>	<b>Yes</b>	<b>No</b>
1	Is assistive technology such as Braille devices, voice recorders, magnifiers, or screen readers available?		
2	Are there sufficient quantities of assistive tools for SWVIs in the schools?		
3	Are teaching materials adapted or utilized (e.g., braille or large print books for SWVIs)?		
4	Are teachers trained in using assistive technology to support SWVI?		
5	Do SWVI actively use assistive technology during classroom activities?		
6	Is the classroom layout safe and accessible for SWVI?		
7	Does the teacher incorporate assistive technology into lesson plans?		
8	Are there barriers preventing effective use of assistive technology (e.g., technical issues)?		
9	Are there challenges faced by teachers or students in accessing assistive technology?		
10	Are signs, maps, or tactile formats used in the school to aid SWVI?		

### Audio Recording Consent Form

As a researcher in the study titled: "*Availability and Utilization of Assistive Technology for Teaching and Learning among Students with Visual Impairments in Selected Primary Schools in Dire Dawa City Administration*" I voluntarily consent to being audio-recorded during the interview and focus group discussion process.

By signing below, I acknowledge and agree to the following terms:

1. My identity and privacy will be safeguarded, and the researcher will maintain strict confidentiality of all information collected.
2. The audio recording will only be used for this research and will not be shared or published outside the scope of the study.
3. The information I provide will be used exclusively for this study and handled with strict confidentiality.
4. Once the transcription of the recording is reviewed and verified by me, the audio file will be permanently deleted.
5. My participation in this study is entirely voluntary, and I retain the right to withdraw at any point without any negative consequences or obligations.

Participant's Name: \_\_\_\_\_

Participant's Signature: \_\_\_\_\_ Date \_\_\_\_\_

Researcher's Name: \_\_\_\_\_

Researcher's Signature: \_\_\_\_\_ Date \_\_\_\_\_