USE OF ASSISTIVE TECHNOLOGY BY LEARNERS WITH CEREBRAL PALSY IN SECONDARY SCHOOLS IN DAR-ES-SALAAM CITY -TANZANIA

BY

MWOCHA MAGALI JANNETH

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DECLARATION

I, Janneth Magali Mwocha, do solemnly declare to the Graduate Board of Kyambogo University that this thesis is my original work and that no part of it has been submitted for another degree in this university or any other institution of higher learning for the equivalent award.

Signature: …… **……**

Janneth Magali Mwocha

APPROVAL

The writing of this thesis followed the guidelines on supervision of research projects positioned by Kyambogo University. It is hereby submitted to the graduate board with our approval as supervisors.

Signature…….. ……

Dr. Eron Lawrence **Date**

PRINCIPAL SUPERVISOR

Signature…….. ……

Dr. Baguwemu Ali Ayub **Date**

SECOND SUPERVISOR

DEDICATION

This piece of work has been dedicated to all persons with Cerebral Palsy in the world especially Agostino, Careen, Elvis, Neema, Edward, Hope, Brian and those who participated in this study.

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Table of Contents

DECLARATION ..... **i**

APPROVAL ..... **ii**

DEDICATION ..... **iii**

ACKNOWLEDGEMENTS ..... **iv**

LIST OF TABLES ..... **viii**

LIST OF ACRONYMS ..... **ix**

ABSTRACT ..... **x**

CHAPTER ONE: INTRODUCTION **1**

1.0.Introduction 1

1.1. Background to the study 1

1.1.1 Conceptual perspective 4

1.1.2 Contextual perspective 6

1.2 Statement of the problem 7

1.3 Purpose of the study 8

1.4 Objectives of the study 8

1.5 Research questions 9

1.6 Scope of the study 9

1.7 Significance of the study 10

1.8 Theoretical framework 10

1.8.1 The relevance of the HAAT model to this study 13

CHAPTER TWO: LITERATURE REVIEW 16

2.1 Introduction 16

2.2 Availability of assistive technologies for learners with cerebral palsy 16

2. 3 The use of assistive technologies for learners with cerebral palsy in secondary schools 18

2.4 The hindrances of assistive technology use by learners with cerebral palsy 22
CHAPTER THREE: METHODOLOGY 28
3.1 Introduction 28
3.2 Research approach 28
3.3 Research Design 29
3.4 Area of the study 29
3.5 Target Population 30
3.6 Sample Size 30
3.7 Sampling Technique 30
3.8 Data collection methods 31
3.8.1 Interview 32
3.8.2 Observation 32
3.9 Procedure for data collection 33
3.10 Data analysis 34
3.11 Ethical considerations 34
3.12 Credibility and Authennticity 34
3.13 Limitations and Delimitations 35
CHAPTER FOUR: PRESENTATION AND DISCUSSION OF RESULTS 36
4.1 Introduction 36
4.2 Demographic characteristics of participants 36
4.2.1 Sampled participants and respondent participants 36
4.2.2 Headteacher characteristics 37
4.2.3 Characteristics of teachers 38
4.2.4 Characteristics of the learners with cerebral palsy 38
4. 3 Availability of assistive technologies for learners with cerebral palsy 39

4.3.1 Low-tech assistive technology 39
4.3.2 High-tech assistive 42
4.4 How Learners with cerebral palsy use assistive technologies 45
4.4.1 The use of assistive technology by learners with cerebral palsy for academic 45
4.4.2 The use of assistive technology by learners with cerebral palsy for non-academic 49
4.5 The hindrances of the use of assistive technologies by Learners with cerebral palsy 53
CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS 67
5.1 Introduction 67
5.2 Summary of findings 67
5.3 Conclusion 68
5.4 Recommendations 69
5.5 Suggestions for further research 70
Appendix i: an interview guide for learners with cerebral palsy 81
Appendix v: Introductory letter 85
Appendix vi: Permission letter 86
Appendix viii: Consent form in Kiswahili 88
Appendix ix: Map of the area of the study 89

LIST OF TABLES

Table 1: Shows the population and sample..... 30

Table 2: Demographic characteristics of sampled participants and respondent participants 37

Table 3: Headteachers' characteristics..... 37

Table 4: Characteristics of teachers trained in Special Needs Education..... 38

Table 5: Characteristics of the learners with cerebral palsy 39

Table 6: Low-tech assistive technology available in the schools 40

Table 7: High-tech assistive technology available in the schools..... 42

Table 8: The hindrances of the use of assistive technologies by learners with cerebral palsy..... 54

LIST OF ACRONYMS

AAC	Augmentative and Alternative Communication
BEST	Basic Education Statistics in Tanzania
CSUCS	Context-sensitive User-centered Scalability
ETP	The policy on Education and Training
HAAT	Human Activity Assistive Technology
HPM	Human Performance Model
ICT	Information, Communication and Technology
IEP	Individualized Educational Program
MoEST	Ministry of Education, Science and Technology
MoEVT	Ministry of Education, Vocational and Technology
NSIE	National Strategy for Inclusive Education
PO-RALG	President's Office Regional Administration and Local Government
PwDs	Persons with disabilities
UNCRC	United Nations Convention on the Rights of the Child
UNESCO	United Nations Education Scientific and Cultural Organization
URT	United Republic of Tanzania
WHO	World Health Organization

ABSTRACT

The development of technology has been a celebration for learners with cerebral palsy in the process of their participation in various educational activities. This study, uniquely, explored the use of assistive technology for learners with cerebral palsy in Secondary Schools in Dar-es-salaam city, Tanzania. This study was guided by the objectives, namely: the availability of assistive technologies used by learners with cerebral palsy in secondary schools; the use of assistive technologies by learners with cerebral palsy in secondary schools; and the hindrances of the use of assistive technologies by learners with cerebral palsy in secondary schools. The Human Activity Assistive Technology (HAAT) model as a theoretical framework guided the study to examine the use of assistive technology by learners with cerebral palsy in secondary schools. A case study design of the qualitative approach was used. The target population for this study was secondary school learners with cerebral palsy, teachers who trained in special needs education and headteachers of special schools. All participants were purposefully selected to participate in the study. The data was gathered using semi-structured interviews and observation techniques. The obtained data were thematically analyzed to bring out the real meaning. The results showed that secondary schools do not have enough assistive technology devices to meet the needs of learners with cerebral palsy. Also, even though the available assistive technology devices are not used by all students with cerebral palsy, most of them do not know how to use them and other assistive technology does not cater the needs of learners with cerebral palsy. Learners with cerebral palsy join secondary school without the knowledge and skills of how to use assistive technology such as computers, which leads to challenges in using such devices. Likewise, most teachers do not have the skills to teach learners with cerebral palsy to use assistive technology because they have not received such training. The study, therefore, recommends that the government should ensure that all secondary schools that have learners with cerebral palsy are provided with adequate assistive technology and devices after assessing the needs and abilities of those learners. Each school should prepare and provide a continuous professional development training for teachers and school staff on the use of available assistive technologies so that to help learners with cerebral palsy access and use it. Parents/guardians should be sensitized on the importance of the use of assistive technologies for learners with cerebral palsy and be well informed on where to access them so that they can be able to provide rightful assistive technologies for their children. The government should provide funds to secondary schools that enroll learners with cerebral palsy should be provided funds for buying and repairing assistive technologies where necessary. The Tanzania Institute of Education should put in Teacher training curriculum the content on how to use different assistive technologies so that all teachers coming out of the training institutions learn and help learners with cerebral palsy use them while at school.The government should encourage non-government organizations to support learners with cerebral palsy by providing assistive technologies in secondary schools.

CHAPTER ONE: INTRODUCTION

1.0. Introduction

This study examined the use of assistive technology by learners with cerebral palsy in secondary schools. The current chapter focuses on the background to the study, conceptual perspective and contextual perspective, statement of the problem, the purpose of the study, objectives of the study, research questions, significance of the study and theoretical framework.

1.1. Background to the study

The Universal Declaration of Human Rights (1948) Art 26 recognises educational accessibility as a fundamental right (UNESCO; 2000). Globally, schools are anticipated to accommodate learners with disabilities and those without disabilities and the provision of inclusive education in mainstream (UNESCO, 1994).

The Convention on the Rights of the Child (UNCRC) (1989), affirms children with disabilities to access all human rights and fundamental freedoms as other children. This highlights the importance of State Parties to the UNCRC in fulfilling their duties. Among others, is to ensure full participation by learners with disabilities including those with learners with cerebral palsy in learning by using assistive technology.

The Convention on the Rights of Persons with Disabilities (2006) Article 3 and 4 specifies that accessible information should be guaranteed to people with disabilities. Article 9 (b) requires states to take adequate measures to ensure equal access to information, communications, and other services, including electronic services, and to be at par with others; persons with disabilities have a right to autonomy of expression through accessible public information and technologies for various disabilities, according to article 21(a), whereas people with disabilities have a right to education without discrimination and on an equal footing, according to article 24

(Pillay, 2014). This means that access to information is critical for participation in learning in particular, and in this case, having learners with cerebral palsy facilitated participation in learning using appropriate assistive technology resources.

The UNESCO policy model for inclusive assistive technologies in the education for PwDs (2014) defines assistive technologies goals at 3 levels: assistive technology first, at a system level, where assistive technologies are viewed as a tool to expand educational opportunities and inclusion for learners with disabilities (example those with cerebral palsy); Secondly, at the organizational level, where educational organizations and all professionals who deal with them (PwDs) are successfully supported in using assistive technology to enhancement participation and learning possibilities; and thirdly, at the learner level, where inclusive assistive technologies are employed to assist learners in participating in inclusive education and personalized learning possibilities affirmed in (Mukhwana, 2021). Although this study is not focused on Inclusive Education, the above model ultimately relates well on use of assistive technology educational tool that support participation in learning by those with cerebral palsy.

Learners with cerebral palsy who have difficulty walking, playing, writing, reading, drawing, pronouncing, and communicating frequently necessitate the use of assistive technology. To attain positive educational outcomes for learners with cerebral palsy, it is necessary to identify obstacles and issues that assist to facilitate the adoption and utilization of assistive technology in schools, and find ssolutions (Samwel, 2015).

Globally by 2050 more than 2.5 billion people will require assistive technology. This number will likely increase to more than 3.5 billion of all age groups. In developed countries access to assistive technology seems to be high due to highly developed in technology. In the contrary, many have not yet accessed assistive technologies in developing countries (WHO&UNICEF,

2022). In Tanzania, only 5-15% of persons who require assistive technologies have accessed them (WHO, 2016).

Assistive technology is a topic of international attention since it improves the involvement in learning for learners with disabilities, particularly those with cerebral palsy. If assistive technologies are provided and utilized appropriately and consistently, they change individuals from their dependence on others by increasing their awareness, competence, independence, and self-confidence, allowing them to realize their full potential (Mwaijande, 2014).

Assistive technology in an educational setting, it enables learners to identify a way around the obstacles they confront and to actively participate in their learning, maximizing the educational outcomes of these learners with learning difficulties. For example, text-to-speech software can help a dyslexic secondary school learner (including learner with cerebral palsy) to overcome her/his reading difficulities so that she/he can cope with the academic demands of reading longer texts. An important point to note is that assistive technologies does not eliminate the challenges and/or distinctions that come with having a disability, instead, it assists learners in overcoming obstacles (Guanming et al., 2022).

A study conducted by Østensjø et al., (2005) on the use and impact of assistive devices and other environmental modifications on everyday activities and care in young children with cerebral palsy. The findings report that modifying the environment and development of gross motor functioning levels as having a positive connection. It also pointed out that the use and advantages of environmental adjustments vary, implying that the requirement for comprehensive assistive technology assessments that consider child factors, technological determinants, and service system elements must be customized.

The study by Huang et al. (2009) in United Kingdom, reveal that frequency use of assistive technology in schools increase participation in learning. The findings were supported by former research by Bottos et al. (2001) and Wiart and Darrah (2002), who observed that assistive devices allowed children to engage in active interactions with their environment rather than becoming submissive observers limited by their physical restrictions.

Another study conducted by Pousada Garcia et a. (2011) in Spain reported that information and communication technologies can only provide continuous support if their applications are used and accompanied with professional engagement. Karlsson et al. (2018) conducted a study in Australia and observed that teachers should be equipped with skills and opportunities for them to work successfully with assistive technology in classrooms.

Unfortunately, there is scarcity of research on the use of assistive technologies for learning by those with cerebral palsy in Tanzani's secondary schools.

1.1.1 Conceptual perspective

Assistive technology is any item, piece of equipment, or device that is used to increase, maintain, or improve the functional capacities of persons with disabilities, whether purchased commercially, adapted, or personalized. It allows persons with complications including those with celebral palsy who are frequently excluded, alienated, and trapped in dependent livelihood to live productively, independent, and dignified lives by allowing them to participate in school, the labour market, and social activities (WHO, 2018).

Assistive technology is classified into three groups such as low-tech gadgets which comprise devices that are not electronic such as picture boards, grips for pencils, handles for spoons adapted, and walkers; middle-tech gadgets comprising audiobooks, computers with word

processors, sound recorders, and other mechanical devices that are easy to use; and high-tech gadgets that are usually particularly built to assist an individual's needs. It comprises software for voice recognition, devices for electronic communication, and mobile technology for guiding, powered wheelchairs, and environmental control Samwel, (2015).

Cerebral palsy denote a set of permanent movement, body control, as well as posture abnormalities that leads to limitated performance in activities which are due to non-progressive disruptions in the developing fetus. Cerebral palsy is often accompanied by sensory, cognitive, communication, and behavioural challenges, epilepsy and secondary musculoskeletal disorders (Stasolla et al., 2018). Cerebral palsy in the educational field falls characteristically under physiological classification and topographical systems. The physiological system describes the motor symptoms of cerebral palsy (spasticity, dyskinesia, hypertonia, ataxia, and mixed kinds); and the topographical system describes the affected body areas by cerebral palsy (monoplegia, hemiplegia, triplegia, quadriplegia, diplegia, and paraplegia) (Landsberg et al., 2005). No matter the category, pesons with cerebral palsy are entitled to education.

Assistive technology are vital for learners with cerebral palsy. They help improve academic performance; coping with the environment; involvement not only in terms of educational activities, but also in terms of the digital realm; the capability to study, communicate, and be knowledgeable as-well-as possess information needed to successful; increased capacity to express emotional needs, develop self-confidence, it turns a person from being dependent to independent; increase social interaction, inspiration and self-esteem; and assistive technology enhance the body functions. Assistive technology create opportunities for participation in education, work market, and in the social life. Help them to live a healty and honored life, and be productive (WHO, 2018; Smith et al, 2016; Visagie et al, 2016; Borg and Stergren, 2015).

Assistive technology can also assist in reducing the need for formal healthcare and support services (WHO, 2016). However, lack of assistive technology may cause social exclusion, poverty, and a greater dependency on family and society for support (WHO, 2016); UNESCO, 2020). Mobility aids can improve a person's confidence and security, allowing them to attain the highest level of independence. Similarly, assistive technology provides several clinical benefits, such as enhancing people's mobility and capacity to do everyday tasks by using wheelchair, walkers and canes (WHO, 2022). Likewise, assistive technology aid in decreasing if not removing the disability, avoiding the deficit to assist the individual in participating in learning and associated tasks, removing barriers and promoting accessibility with a great deal of ease and efficiency, which would not have been possible otherwise (Ahmad, 2014).

1.1.2 Contextual perspective

In Tanzania, the use of assistive technology by learners with cerebral palsy is supported by several policies and legislations. The Persons with Disabilities Act of 2010 Article 24 forbids all forms of discrimination in the provision of education at all levels; The Information and Communication Technology policy for basic education, 2007 in No. 6.1.4 recognizes the significance of providing suitable Technological equipment for persons with special needs, and in 6.2.1 it requires MoEVT to integrate ICT in the curriculum at all primary, secondary, teacher education, and in non-formal and adult education; The Education and Training policy (ETP), 2014 in section 3.1.3 and 3.1.5 and 3.2.8, ensures free and compulsory education for all and that education should be provided using technologies. In section 3.2.9 states that the government will ensure appropriate equipment, materials and tools for teaching and learning in education and training are adequate according to the needs and development of science, technology and teaching and learning methods at all levels, section 3.2.12 states that the government will ensure

the existence of suitable infrastructure to meet the needs of education and training for all groups at all levels of education and training and section 3.2.13 states that the government will ensure that essential services including good food, communication, electricity, clean water and safety, and health are available in schools and colleges; and the National Strategy for Inclusive Education, 2021-2026 emphasizes inclusive education and community involvement. To ensure policies are implemetente, the government has procured and distributed educational resources including equipment and assistive devices to all schools which enroll learners with disabilities across the country (URT, 2021).

There are 54 government and 48 private secondary schools in Dar-es-Salaam City council (URT, 2020). Two of these schools are Inclusive schools where learners with cerebral palsy are enrolled from all over the country. Despite this good gesture of the government supplying assistive technology to these schools, there seem to be challenges associated with the usage of assistive technology for learning by learners with cerebral palsy in secondary schools. These include limited training for both teachers and learners with cerebral palsy on their use, inadequate assistive technology compared to the number of learners with cerebral palsy, and poor assessment of students' needs and learning, among others. This indicates that assistive technology adoption and use in secondary Schools in Tanzania remains to a large extent out of reach for learners with cerebral palsy characterized by unreliable provision and use.

1.2 Statement of the problem

The use of assistive technology has become increasingly significant in the 21st century worldwide and offers great potential in teaching and learning (UNESCO, 2020). The Government of the United Republic of Tanzania through the Ministries of Education, Science and Technology (MoEST) and President's Office of Regional Administration and Local

Government (PO-RALG) have made efforts to improve the education of learners with disability in the country through procurement and distribution of educational resources including equipment and assistive technology to all schools which enrol learners with disabilities across the country(URT, 2021). Despite all initiatives that have been put in place by the government to support education for procuring and distributing educational resources to all schools which enroll learners with disabilities across the country. It seems that learners with cerebral palsy who are studying in secondary schools still have challenges in using assistive technology.

Besides, numerous studies on the use of assistive technology for learners with disabilities have been conducted in higher education institutions Eligi and Mwantimwa, (2017); Kisanga, et al., (2018); Kamaghe et al., (2020); Mwantimwa, (2020); Mwantimwa, (2020); Kisanga, S. E.&Kisanga, D. H. (2020); and Ngonyani and Mnyanyi, (2021)). However, less attention has been given to lower levels of education including secondary schools in terms of research studies on the use of assistive technology. This study will try to link the use of assistive technology by learners with cerebral palsy in secondary schools.

1.3 Purpose of the study

The purpose of this study was to examine the use of assistive technology by learners with cerebral palsy in secondary schools

1.4 Objectives of the study

This study was guided by the following objectives:

i. Establish the available assistive technologies for learners with cerebral palsy in secondary schools

ii. Examine how learners with cerebral palsy use assistive technologies in secondary schools

iii. Analyze the hindrances of the use of assistive technologies by learners with cerebral palsy in secondary schools

1.5 Research questions

The study was guided by the following research questions:

i. What assistive technology is available for learners with cerebral palsy in secondary schools?

ii. How do learners with cerebral palsy use assistive technologies in secondary schools?

iii. What are the hindrances of the use of assistive technology for learners with cerebral palsy in secondary schools?

1.6 Scope of the study

This section of the study presents the content scope, geographical scope and time scope:

The study has been constrained to exploring the use of assistive technology by learners with cerebral palsy in secondary schools by exploring the available assistive technologies for learners with cerebral palsy in secondary schools, how learners with cerebral palsy use assistive technologies in secondary schools and the hindrances of the use of assistive technologies by learners with cerebral palsy in secondary schools.

The study was carried out in two secondary schools found in Dar-es-salaam city, the eastern part of Tanzania around the Indian Ocean. The schools were selected because of being the oldest secondary schools enrolling learners with cerebral palsy. The study took 1 year from 2021 to 2022

1.7 Significance of the study

It is hoped that the findings of this study may:

1. Be a source of vital information to policy makers and planners, education implementers, donors, teachers, parents and learners with cerebral palsy in Tanzania on the need for assistive technologies;
2. Provoke policy development towards supply and use of assistive technology for learners with cerebral palsy;
3. Be useful as a reference for decisions on the education of learners with cerebral palsy who are using assistive devices in secondary schools;
4. Enable teachers to develop skills in the use of assistive technology in teaching life skills, self-employment and entrepreneurship for learners with cerebral palsy; and
5. A base for future researchers in the same discipline.

1.8 Theoretical framework

This study was led by a rehabilitation model called Human Activity Assistive Technology (HAAT) model, which was proposed by Albert Cook and Hussey in 1995. HAAT model is an improvement of the Bailey Human Performance Model (HPM) of 1989, (Giesbrecht, 2013). The HAAT Model is a reform of the HPM and comes with four components; the human, the activity, the Assistive Technology, and the context. There is a strong connection between the three components (human, activity, and Support Technology), and the context has an impact on these three components. This HAAT model was reviewed again by Albert M. Cook and Miller Janice Polgar in 2008, (Mukhwana, 2021). The model was generated to guide the selection, assessment and decision-making on the design, and instructions as well as the evaluation of the results of the Assistive Technology.

The human element has physical, cognitive, and emotional components. Physical capabilities comprise equilibrium, range of motion, power, and coordination. Cognitive abilities comprise problem resolving, carefulness, and concentration. These have impacts on people's emotional capacities. It is vital to understand these human capacities because they almost certainly influence how assistive technology is used. As a result, a match between human capabilities and assistive technology requirements is required for effective assistive technology utilization. Additionally, assistive technology may provide aid in areas where the individual has difficulties, such as hearing or vision. For instance, in the case of hearing loss, assistive technology can supply a gadget that allows the person to sustain their hearing abilities. The activity component comprises efficiency, self-care, and recreation activities. Efficiency activities are educational, vocational, and household management. Self-care activities such as communication, hygiene, dressing, eating and mobility. Recreation activities comprise enjoyment or relaxation including things like reading books watching television, dancing or resting. These activities may necessitate a variety of qualities, both physical and cognitive. The person may not have the ability to perform an activity, but with the help of an assistive technology system, she/he may be able to regain that capacity. The assistive technology is referred to as extrinsic facilitators since they provide performance that is hampered by a disability involving external limitations. Choosing or planning an assistive technology system should take into account the person's needs, capabilities, and ambitions. The context comprises things like culture (e.g., behaviour, beliefs, attitudes), physical surroundings (e.g., house, school, workplace, or garden), institutions (religious, educational institutions), and social settings (family, friends, visitors, caregiver and doctors). The environment's facilitators and barriers are critical in the selection, evaluation, and application of the assistive technology system. Learners with cerebral palsy should be given

assistive technology by considering their needs, skills and capabilities. Therefore, before deciding on an assistive technology system for learners with cerebral palsy, a thorough assessment of functions, activities, and surroundings is required.

HAAT is user centred and emphasizes the uniqueness of every technological system regarding the specific user, desired activity and environment. The value of a personal assistant is also highlighted, especially for people with severe disabilities, this is very important to learners with cerebral palsy in their learning.

The structural emphasis of this model lies in the activity while the performance of the activity is centred within the assistive technology system which serves as the component and output. Assistive technology, therefore, appears to be an external feature that enables the user to perform the activity she/he wants and a strong interaction between the first three elements is influenced by context.

Several scholars have used the HAAT model in the rehabilitation of people with disabilities in the following ways:

In a research utilizing assistive technology to enable play by children with physical disabilities, the HAAT model was used as a basis for evaluating the overall performance of the play activity; the context of the game as an activity took place became a driving force in identifying options and adjusting computer components as well as activities; and the child's cognitive ability, motivation, and participation levels were very important in determining the use of a computer access device such as assistive technology (Besio, 2004).

The HAAT model is being applied in the study of Context-sensitive User-centered Scalability (CSUCS), which uses exergames and the production wizard to enrich sports exercises for the

elderly, as well as an assistive system that uses gamification elements to enrich the working experience of the individuals with disabilities and elderly (Korn et al., 2012).

In research on Text Signs and Access to Educational Documents to explain access to document text as well as text signals, (Kouroupetroglou, 2014) used the HAAT model. This was done to enable electronic documentation, either in the format of a standard file format such as .pdf .doc, .ppt or a Web document, to view it successfully, proficiently, and satisfactorily with most functionality in all circumstances or context including during the learning process.

The HAAT model was used by (Akyurek et al., 2017) in describing the context/setting according to the physical environment such as home, school, workplace; governing policies; the social and cultural context (family, peers, and strangers) determines the structure, development, and guidance in assistive technology and care for the person with disabilities. They also find that when using HAAT in education, it is important to understand and consider the educational activities that a user may engage in before setting up an assistive technology as these factors can simplify or hinder its user.

Mukhwana (2021) employed the HAAT model to describe in what way information and communication technology is applied to teach learners with low vision in schools, his study, wanted to find out how Information and Communication Technology materials are used in teaching learners with low vision.

1.8.1 The relevance of the HAAT model to this study

This model is in line with this study for the reason that for learners with cerebral palsy in order to participate effectively in learning and do well in their learning, they need to principally use assistive technology. Due to the different types of disabilities in each case, each learner has a

unique need for assistive technology. So, the current study concentrate more on the utilization of assistive technology in individual learning which is obtained from the HAAT model. The model resonates well with this study in a way that the 'Human', who in this incident is the learner with cerebral palsy has to interact with the assistive technology obtainable in the school setting to increase his/her participation and involvement in learning activities at school. These assistive technology resources are external enablers in learning for learners with cerebral palsy. She/he has to be familiar with and skilful in using assistive technology in their learning.

Learners with cerebral palsy in secondary school need to rely on assistive technologies for them to walk, concentrate, write, listen, and store their notes. Learning consequences for learners with cerebral palsy in secondary schools depends on how one interacts with assistive technology in a physical environment, the attitude of the school members (teaching and, non-teaching staff, children with and without disabilities.

Use of assistive technology by learners with cerebral palsy also requires a teacher's skill that is essential in learning and facilitating their participation in the whole learning process (Cook & Polgar 2008). Expertise for teachers enables them to understand and use the assistive technologies. Additionally, the type of school activities and the utilize of assistive technologies are important for learners with cerebral palsy who need different types to be used. Activities such as walking, reading, writing, mobility, and recreational activities including sports may need to be adjusted for them to be used in learning.

In terms of how learners with cerebral palsy use assistive technology in learning in secondary schools, physical environment should be accessible and appropriate including classrooms and wide doors that facilitate access, classroom chairs, and laboratories; social and cultural context including the views of learners with cerebral palsy, other ordinary peers as well as teachers

deciding on the use of assistive technologies used in learning. School policy may also allow the learners with cerebral palsy to own an assistive technology even after the lesson in the classroom this will increase the learners' ability to complete the task and continue to use it for communication outside the classroom, in school, and even in the community (Cook & Polgar, 2008).

HAAT model also depends on the origin of the assistive technology available for selection. Assistive technologies have an impact on learners with cerebral palsy learning and thus determine the outcome of their learning in secondary schools. If learners with cerebral palsy get enough appropriate assistive technology equipment it will strengthen their learning.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This part presents appropriate literature correlated to the research. An overview of the use of assistive technologies by learners with cerebral palsy is provided. The overall points of the use of assistive technologies are being discussed from a different perspective as references from other writers/scholars. The literature is presented under the following headings derived from the objectives: availability of assistive technologies for learners with cerebral palsy in secondary schools; the use of assistive technologies for learners with cerebral palsy in secondary schools; and the hindrances of the use of assistive technologies for learners with cerebral palsy in secondary schools.

2.2 Availability of assistive technologies for learners with cerebral palsy

Many persons with disabilities in this era of digital inclusion and globalization, greatly need to utilize assistive technology to continue working independently (WHO, 2022; UNESCO, 2019). Additionally, World Health Organization approximates, more 1 billion persons or more require assistive technologies, and persons with disabilities are among them. By 2050, the number of persons who will be using assistive technology is predicted to approach two billion (WHO, 2018). Assistive technology includes visual aids, hearing aids, augmentative and alternative communications, walking frames, wheelchairs, and prosthetics like artificial legs WHO, (2018). Also, the field covers information and communication technologies including computers, screen reading software, and special phones. WHO (2018) explained more that internationally there are limited assistive technology availability due to the growing needs of assistive technology that was not being fulfilled.

Investigation done by Yusuf et al., (2012) about the availability of assistive technology in educational institutions, the result showed, there are no required assistive technologies for learners with disabilities in many institutes. Equally, Onemeje (2017) reveals that there are a limited number of assistive devices available for special education in schools. Onemeje elaborates that the available assistive technologies were used by few learners.

Assistive technologies are categorized into high-tech and low-tech devices (Ahmed 2018; Viner et al., 2020). The low-tech assistive technologies are those that are simply designed and simple to produce, low-cost, easily accessible, and do not require more training during use. These may include devices like pencil and pen grips, eyeglasses, wheelchairs, crutches, writing and reading stands, adapted desks, pictures for communication, modified eating utensils, using special paper to help learners to read and write, head pointers, and whiteboards. They urge that these devices are available in the environment for the use of learners with disabilities. On the other hand, Coleman (2011) explains that high-tech assistive technologies as electronic like computers with assistive software that increase physical access, and the capacity for communication and performing academic tasks. Likewise, Zupan and Jenko (2012) describe high-tech assistive technology such as computerized communication systems as well as Augmentative Alternative Communication, iPad, smartphones and powered recreation. Also, (Viner et al., 2020) observe that high-tech assistive technologies are more sophisticated and usually programmable such as computers with expanded keyboards and screens modification (hardware or software).

Saturno et al., (2015) observes that children with cerebral palsy encounter unique obstacles as a result of motor dysfunction and communication difficulties. They communicate by eye and blink motions and low-altitude fingers and toe movements. To aid communication, Augmentative and Alternate Communication can be utilized.

Ahmad (2014) explains that the availability of assistive technology is vital for learner's participation in learning through accessible information, curriculum, learning resources, and availed support services. Ahmad adds that assistive technology should not be used as a tool for rehabilitative or re-mediation by educators, rather, it should be a gist towards accessible curriculum and a means to for learners to attain their academic dreams. Moreover, assistive technology assist learners to equally learn in at in common classroom by eliminating barriers that hampher them from attaining a quality education.

The availability of assistive technologies in secondary schools for learners with cerebral palsy is very important for their participating in school activities. The identified gap in the literature review above was that has not been any studies locally that has been conducted to examine the availability of assistive technology for learners with cerebral palsy in secondary schools, Tanzania. Most of literature are from outside East Africa countries and those literature was not based in secondary schools. To address this gap, the study focused on the availability of assistive technologies for learner with cerebral palsy in secondary schools in Tanzania.

2. 3 The use of assistive technologies for learners with cerebral palsy in secondary schools

Use of assistive technologies is very important for learners with cerebral palsy. Success of these learners is through the use of such assistive devices. All over the woldwide, scholars have done their work on the use of assistive technologies for learners with disabilities.

A study on the effectiveness of assistive technology for children with special needs by Maor et al., (2011) revealed that assistive technology has possible benefits in improving performance to children with special needs particulary those with cerebral palsy in primary or secondary school learners' reading, spelling, writing, and speech skills. Additionally, Ahmad (2014) argues that accessing the curriculum is made possible by utilizing assistive technologies to help

inabilities learners particularly those with cerebral palsy to perform academic tasks such as reading, writing and doing mathematics.

Ahmed (2018) conducted a study about the insights of manipulating assistive technology for Learners with disabilities in the school settings. The study findings indicated that assistive technology can help learners who have challenges or disabilities to meet their educational needs and be able to take part in their education in an easily accessible environment for learning inside and outside the classroom. Ahmed therefore, suggests that assistive technology possibly is a beneficial instrument for learners with disabilities in creating a memorable learning experience. Ahmed adds that everyone can learn and perform academically when accessing the learning environment, therefore teachers, parents, families and the community should work together on creating a good learning environment.

However, in Spain the utilize and effects of assistive technology and other modified environment can be beneficial to daily activities and care in children with cerebral palsy. The investigation discovered that there differentiation in the uses and advantages of the environmental adjustments, indicating the need for thorough assistive technology assessments which include child aspects, family aspects, technical aspects, and system aspects (Sigrid et al., (2015).

Coulon (2015) conducted a study on effects to assistive technologies on indivual learners with disabilities in classroom. Study points out that when learners with physical disabilities use assistive technology such as electronic notebooks, adapted computers, software, and speech generators iPads, their engagement and academic performance would be increased. For example, spelling or writing skills. Likewise, the utilization of augmentative devices and computers by people with cerebral palsy has demonstrated that Information and Communication Technologies

can only provide continuous support if they are used in conjunction with complete professional participation (García et al., 2011).

The study conducted by Zupan and Jenko, (2012) on assistive technology for people with cerebral palsy indicates that learners with cerebral palsy who are non-oral or whose speaking difficult to understand can benefit from utilizing a communication assistive devices. They add that individuals can communicate more successfully and readily with the help of Alternative Augmentative Communication (AAC) technologies such as; voiced word processing, symbol systems, configurable switches, electrical communication gadgets, speech synthesizers, recorded speech devices, communication improvement software, communication boards, and voiced word processing. Learners with cerebral palsy may be able to talk more easily, interact in daily living with others. A study by (Raya et al., 2012) in Spain entitled 'new strategies of mobility and interaction for persons with cerebral palsy' found out that wheelchairs as assistive technology for mobile devices are most used by persons with cerebral palsy for performing everyday activities. They further add that other assistive technologies used to support persons with cerebral palsy in mobility are walkers, canes and orthosis.

Learners with disabilities can be advantaged by using assistive technology to improve and increase academic performance and participation in school activities (Alnahdi, 2014). Equally, Huang et al., (2009) in a study on the usage of assistive technology at schools by learners with cerebral palsy. The research find out there is a wide usage of assistive technology in the school environment. Likewise, Learners with cerebral palsy suffer from language problems due to brain damage, and also have motor difficulties, that prevent them from applying a standard mouse or keyboard on a computer (Al-Qudah et al., 2014). They continue to say that learning can be

enhanced by using iPads, spectacles, mouth controls, and eye control making the computers they use specialized to their needs without compromising on the content.

Similarly, Doush and AlMeraj (2019), point out that augmentative and alternative communication helps persons with communication problems to perform their daily activities. They elaborate that children are helped by augmentative and alternative communication tablet application that uses pictures on the screen and voice feedback. Furthermore, they say that assistive technology such as iPads can be utilized to enhance learners with communication problems like learners with cerebral palsy who have difficulties articulating words resulting from the effects on their muscles.

(Lohmann et al., 2019) writes about utilizing assistive technology devices to enhance learning in the inclusive classroom. They observe that learners with disabilities should be supported in mobility, independence and communication. Furthermore, the findings indicate that there are low-tech and high-tech assistive devices for mobility, communication and independence. The low-tech include pencils and paper, picture boards, images, and drawings and the high-tech are tablets, smart phones, speech generating devices and apps. These assistive technologies improve communication for learners with disabilities such as those with cerebral palsy. They add that mobility assistive technologies are very crucial for movement and exploration to the surrounding environment. The low-tech devices such as walkers, manual wheelchair and scooter board are motor less, less expensive and are usually easier to access and the high-tech assistive rely on battery and electricity to run the devices like power wheelchair.

Bousquet and Agustsson (2021) conducted a study on postural asymmetries and assistive tools applied by grown person with cerebral palsy in lying, sitting, and standing in Sweden. Findings reveal that assistive device such as adjustable beds, wheelchairs, standing equipment and seating

systems were used. The results also show that many persons with cerebral palsy use wheelchairs as seating assistive devices than other devices. Equally, Al Ghurair et al., (2021) done an investigation on children with language disability. The findings indicate that the Augmentative and Alternative Communication tablet, which uses on-screen pictures and voice feedback helps children with language impairment to communicate more efficiently. They further add that gadgets such as iPads, spectacles, mouth controls, and eye controls, have been confirmed to be easy and recognizable to use by persons with intellectual impairment and physical disabilities, also they can help persons with severe disabilities to communicate.

Assistive technology needs to go together with the proper services which comprise assessment, referral, treatment, finance, product preparation, ordering, fitting/adjusting the product to the user, maintenance and repairs, teaching the user or family members and follow-up Borg, (2019). The results of using assistive technology by learners with cerebral palsy can be significantly influenced by the services provided.

Throughout the literature review, it was discovered that there are no studies that have been carried out concerning the use of assistive technologies for learners with cerebral palsy in secondary schools in Tanzania. This lack has created a gap for them to join in school deeds. This study addressed this by focusing on the use of assistive technologies for learners with cerebral palsy in secondary schools in Tanzania.

2.4 The hindrances of assistive technology use by learners with cerebral palsy

There are various factors which may hinder the utilization of assistive technology by learners with cerebral palsy. It include limited funds, training, insufficient assessment and planning processes, maintaining equipment, teacher preparation and support, staff attitudes, and time limits (Ahmed, 2018).

The study carried out by Chukwuemeka and Samaila(2020) on assistive technology to inabilities learners in inclusion settings. Study reveal that assistive technologies were effecient in rising the inclusion then involvement of these learners. Furthermore, there was insufficient training on utilizing assistive technology also inadequate information on availability. Similarly, another study affirms that specialist teachers have slight or no teaching preparation on assistive technology to help inabilities learners (Flanagan et al., 2013). They continue to explain by saying that shortage on training and skills on assistive technology by specialist teachers may hinder learners with disabilities to perform tasks.

Woodbury (2015) elaborates barriers to assistive technology into two types; that is, extrinsic to teachers and intrinsic to teachers. Extrinsic to teachers is as associated with lack of resources that includes funding, training and infrastructure. The second type which is intrinsic to teachers is associated with attitudes and perceptions. These types of barriers are harder to recognize and influences the first type. Equally, teachers' attitudes toward using assistive technology in teaching were identified by various investigators as the hindrances of assistive technology use by learners with disabilities (Jacobsen, 2012; Woodbury, 2015; Umoeshiet, 2020).

Toto and Limone (2021) in a study revealed the inadequate skills of teachers and familiarity in the utilize of assistive technology. They recommend that teachers need training to enhance the ability on the use of assistive technology for learners with disabilities. Similarly, Ahmed (2018) observes that in-service teachers have received insufficient training on assistive technology use for disabilities learners particularly those with cerebral palsy. Likewise, the study by Samwel,(2015), on the influences on learners' use of assistive technology in school, revealed that there is a require for educators to be granted enough hours and opportunities to develop their skills so as to aid them to utilize efficiently the assistive technology in classroom. Lersilp et al., (2018) in the

study of the barriers towards use of assistive technology and learning settings for special needs children. They observe that not all learners use the available assistive technologies in the school because not all are needed for all learners with disabilities. Their needs depend on the affected part or type of disability. Similarly, Coulon (2015) argues that assistive technology might be useful for individual learner but might not be useful for further learner with the similar disability.

Assistive technology has a huge potential to help inabilities people to engage optimally in community, live independent and fulfilling life, but the accessibility to assistive technology to many people with disabilities is still a challenge. In many developed including developing countries, persons with disabilities have no access to or very limited assistive technology. This happens for different reasons such as policies, lack of knowledge to use assistive technology, and procedures that can provide assistive technology to those who might benefit. In addition, lack of awareness, unavailability of assistive technology devices, issues of affordability, inadequate financing, high cost, and scarcity of assistive technologies compared to the number of the users can also be barriers (Borg, 2019; WHO, 2022; Chukwuemeka and Samaila, 2020); Batanero et al., 2022).

Moreno et al., (2021) recommend that there is need for individualized support; the need to promote the skills development of the professionals (teachers) working with children with disabilities including those with cerebral palsy; the accessibility of spaces and adaptation of programmes as well as developing training courses that promote inclusion of learners with cerebral palsy.

Chukwuemeka and Samaila (2020) observe that educators' capability and ability in the utilize of assistive technology in tutoring inabilities learners are so crucial that we can't speak about the

utilize of technology without understanding how efficiently the educators are utilizing it. Likewise, a research done by Dominic et al., (2020) on assessing the available, competence and situation of high-tech assistive in special instruction schools reveals that the important required high-tech assistive resources for learning and teaching were not available. Also, for those available did not fulfil the requirements of inabilities learners in schools.

Connor and Beard (2015) observe that several teachers have limited knowledge on the assistive technology use. As a result, they don't use assistive technology which is available in schools. They continue to say that teachers believe that assistive technology is usually used by those who are attending specialized training.

Alkahtani (2013) reveal that educators lack enough skills and understanding on utilizing assistive technology. Further says that teachers need the training to improve their understanding of employing assistive technology then use it to train learners with disabilities including those with cerebral palsy. Alkahtani argues that teachers' attitude toward learners with disabilities on assistive technology delay and impede learners' progress and skill development. Alkahtani further explains that teachers' negative ideas and point of view take part in their prevention of choosing or using assistive technology for inabilities learners.

However, cost, usability, and lack of training are obstacles to the utilize of assistive technology in literacy (Flanagan et al., 2013). Similarly, The research conducted by Woodbury (2015) shows that teachers have a negative attitude towards using assistive technology to teach learners with disabilities including those with cerebral palsy. Also, teachers believe that using assistive technology in teaching is too time-consuming. On the other hand Maraizu (2014) find out that inadequate educational funds affect the education of learners with disabilities with learners with

cerebral palsy inclusive. Maraizu goes on to say, there was a lack of funds to repair broken, purchase new and necessary assistive devices needed by schools to cater to their learners' needs. Equally, Dwivedi (2019) argues that the major hindrance to assistive use is the lack of funds for repairing of the device.

Sholanke et al., (2019) observe that persons with physical disabilities are frequently marginalized as a result of inadequate accessibility facilities in public environments, including schools. They also reveals a scarcity of ramps as alternative components to footsteps and stairways in some secondary schools. Equally, Goggin (2021) explains that many countries have restricted access to infrastructures as well as electronicl library, the internet and assistive technology.

Coleman (2011) state that teachers of learners with physical disabilities (including learners with cerebral palsy) should be given training in assistive technology so that they know how to teach those learners to use assistive technology and be trained to make sure teachers meet the requirements of their learners. Ahmad (2014) observes that learners must be trained on how to oparate the assistive technology so as to use it effectively.

According to Umoeshiet (2020) teachers' awareness of assistive technology is very significant because it can help them in the school budget for government or donors, to make requests for purchasing and advising parents on the assistive technologies needed by their children. Similarly, Dwivedi (2019) points out that a lack of awareness about new and quality devices among these professionals limits them to recommend appropriate devices as needed. Teachers without awareness of the availability of various assistive technology and the needs of learners with cerebral palsy put learners at a disadvantage.

The literature above shows limited studies in regards to hindrances of assistive technology use by learners with cerebral palsy and there was no study conducted from Tanzania. This was the gap that has been identified which hinder the use of assistive technology by learners with cerebral palsy in secondary schools. This study addressed this gap by focusing on the hindrances of assistive technology use by learners with cerebral palsy in secondary schools.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This study examined the use of assistive technology by learners with cerebral palsy in secondary schools. This study was guided by the following objectives: establish the available assistive technologies for learners with cerebral palsy in secondary schools; examine how learners with cerebral palsy use assistive technologies in secondary schools and analyze the hindrances of the use of assistive technologies by learners with cerebral palsy in secondary schools. This chapter presents the methodology that was used in this study. It explains the research approach, research design, area of the study, target population, sample size and sample technique, research instrument, the procedure for data collection, data analysis and ethical considerations.

3.2 Research approach

The study used a qualitative approach in examining the use of assistive technology for learners with cerebral palsy in secondary school. Qualitative research is the process of gathering, analyzing, and interpreting information through the description of objects given. The qualitative approach was selected due to its importance of focusing on a few circumstances and several variables. Qualitative research is primarily concerned with understanding a person's experience of a certain phenomenon and focuses in-depth on relatively small samples that are carefully chosen (Robinson, 2014). A qualitative approach was chosen to provide a deeper understanding of how to use assistive technology in enhancing participation from the perspective of teachers and learners. The goal of the qualitative approach is to do research that seeks a deeper comprehension of a phenomenon rather than to explore for causal connections, and it sets out to penetrate human knowledge and construction of that phenomenon Creswell, (2013). Additionally, the qualitative approach calls for experiencing and investigating activities in their

naturally structured social environments, such as schools, playgrounds, and classrooms Picciano (2004).

3.3 Research Design

Research Design is the framework and design of the investigation method used to collect data to address the research questions; it explains how the study was carried out, including how, when, and from whom the data will be collected. In addition, the research design is a blueprint of how one intends to conduct the research (Creswell. J.W. & Creswell, 2017). In this study, a case study research design was used. A case study is an empirical investigation that investigates a current phenomenon (the case) in the context of the real world (Creswell, 2013; Yin, 2014; and Bryman, 2016). A case study allows for a better knowledge of the issue. A case study often focuses on a single individual, although other instances may include institutions, organizations, events, neighbourhoods, and programs, (Yin, 2014). A case study addresses the who, what, and why of events and offers a chance to study reality.

The researcher chose a case study design so as to study the phenomenon in depth and its real context. Each participant was treated as a case during the study because everyone has his/her own experience different from others. The study used multiple “cases” that were two secondary schools which enroll learners with cerebral palsy in Dar-es-Salaam city.

3.4 Area of the study

The study was conducted in the Dar-es-Salaam City council which is in the Dar-es-Salaam region, along the Indian Ocean eastern part of the United Republic of Tanzania. Dar-es-Salaam City council was selected for this study due to its history of having the first two secondary schools to enrol learners with cerebral palsy in the country.

3.5 Target Population

The target population is the theoretically confined, specifically defined subset of potential participants to which the researcher may have access and which most closely resembles the population of interest (Casteel & Bridier, 2021). They continued to say that the sample is established from the target population. To achieve this, the study target population was learners with cerebral palsy who use assistive technology, teachers trained in special needs education who interact with learners with cerebral palsy and train them to use assistive technology and headteachers of the schools who perform administrative roles such as preparing school budgets on assistive technology and looking for stakeholders who can provide assistive technology to learners with cerebral palsy.

3.6 Sample Size

A sample refers to a part of the population that presents the characteristics of a population (Kabir, 2018). In this specific study, the sample was eleven (11) learners with cerebral palsy, four (4) trained teachers in special needs education, and two (2) secondary school headteachers, the total sample size for the study will be seventeen (17).

Table 1: Shows the population and sample

Participants		**Population**	**Sample**
Learners	School "A"	7	7
Learners	School "B"	4	4
Teachers	School "A"	22	2
Teachers	School "B"	18	2
Headteachers		2	2
Total		**53**	**17**

3.7 Sampling Technique

There are many sampling techniques used in the qualitative approach such as convenience sampling, purposive/judgment sampling, snowball sampling, and quota sampling. For this study,

purposive sampling was used to select participants. Purposive sampling, also known as judgment sampling, is a deliberate choice of a participant based on the traits and qualities the person possesses, (Etikan & Babatope, 2019). Purposive sampling is a strategy that involves selecting the units that are most knowledgeable or relevant in a subject matter and using them. Purposive sampling, according to Cohen et al. (2011), makes it possible to find knowledgeable people based on their knowledge, role, competence, and experience.

The researcher selected learners with cerebral palsy purposively on the criteria of those who benefit from assistive technology. This is because assistive technology users have experiences which could be valuable to the study. The researcher was selecting trained teachers in special needs education on the criteria of seniority and gender balance. The reason being that the senior trained teachers have experience with assistive technology for learners with cerebral palsy. They interact with learners with cerebral palsy and are advisers on the use of assistive technology for this category of learners. The headteachers were selected for the reason that they are administrators. They prepare the school budget for buying assistive technology and are looking for stakeholders who can provide assistive technology to learners with cerebral palsy.

3.8 Data collection methods

There are several techniques of data gathering in qualitative approach such as interviews, observations, focus groups, and documentary analysis (Yin, 2014). The interviews and observation were the methods used for data collection in this study. The study use triangulation in data collection to increase the trustworthiness and accuracy of the given information. Triangulation is a way used to increase the credibility and validity of findings in research (Noble & Heale, 2019).

3.8.1 Interview

In qualitative research, there are three categories of interviews which are structured, semi-structured and unstructured (Bryman, 2016). In this study, semi-structured interviews were used. An interview entails the delivery of information to the interviewer and is often conducted face-to-face between a researcher and a participant (Creswell, 2013). The semi-structured interviews were used due to the flexibility of changing questions to make the interviewee understand the concept and also allow probing. To facilitate communication, the Kiswahili language has been used so that learners with cerebral palsy can participate fully in the study due to the challenge they have in communication. The interview guide for learners with cerebral palsy was translated from English to Kiswahili Language by a secondary school teacher who specialised in teaching English and Kiswahili language subjects respectively. The researcher used a tape recorder to record the interview to maintain the original data. Thereafter the information from the audio was transcribed into text.

3.8.2 Observation

Observation is the practice of gathering unstructured, first-hand knowledge through observing people and environments (Creswell, 2013). There are two types of observation thus participatory and non-participatory observation. The observation method was used as an instrument of data collection because it provides useful and current information. The observation method provides firsthand information that can direct access to research phenomena, collect, check and record accurate data, and is a simple method of collecting current data. The researcher made use of this method to obtain evidence on the use of assistive technology by learners with cerebral palsy in secondary schools. The researcher made use of the observation method to obtain information about the availability of assistive technology and how learners with cerebral palsy use it. The

observations were made using an observation guide and the researcher recorded in the notebook what was observed.

3.9 Procedure for data collection

The researcher developed data collection instruments which were validated by a pilot study. Thereafter, the researcher got an introduction letter from the Faculty of Special Needs and Rehabilitation at Kyambogo University to help her access the field. The researcher took the introductory letter to the Dar-es-Salam Regional Administrative Secretary recommended the letter to the Director of Dar es Salaam City Council for clearance for data collection. The Director of Dar es Salaam City Council wrote a clearance letter to the headteachers of schools of the study.

The researcher presented the introduction letter to the school headteachers. The headteacher helped the researcher with information which helped in sampling participants. The researcher was introduced to the participants. The researcher met each of them and explained the prupose of the study which also helped to develop rapport with them. Thereafter the researcher made an appointment with the respective participants for an interview. Meanwhile, the researcher sought permission to observe the available assistive technologies in school and how learners with cerebral palsy use them.

Interviews were held with each participant on the day and time agreed upon. Each interview lasted between 45 minutes to 1 hour. The interviews were recorded to ease transcription. A follow-up interview was made after transcription and observation of the assistive devices. The follow up interview helped clarify on some points.

3.10 Data analysis

Data analysis is the process of analyzing, cleaning, manipulating, and modelling data. It is the process of summarizing and analyzing the raw data to extract its meaning and pattern (Kawulich, 2015). To find relevant information, support inferences, and help decision-making, data analysis is crucial. After the process of data collection, the data were transcribed from audio format to text format. The data were categorized into themes and sub-themes that emerged from the data. The data was presented thematically to derive meaning from them and real narratives from the participants were integrated into the presentation as a way of maintaining originality.

3.11 Ethical considerations

Ethical considerations are a set of principles that must be followed in conducting any type of research. Bryman, (2016), says that ethical considerations help to increase the research's credibility. To deal with the privacy of individuals and institutions, ethical issues are crucial when conducting research. The researcher adhered to the principles of research ethics by explaining clearly to the participant the purpose of the study which is academic work; assuring the participants about confidentiality; seeking consent from the participants before engaging them in the interview; and voluntary participation of the participants. During the interview, the researcher used codes to differentiate the participants.

3.12 Credibility and Authennticity

Credibility and or Authenticity refers to the criteria for evaluating how the research results are true, reliable and transferable in the face of not only the researcher but also the research participants and readers (Gagani, 2019).

To ensure the credibility and truthworthiness of the research findings, the following measures were taken:

The tools were designed, discussed and validated together with my supervisors. Trangulation was used in data collection involving semi-structured interviews and observation. Also the data was collected from two schools involved different participants to ascertain the truthworthiness of the information. The narratives from the participants have been presented in the data analysis as a confirmation of what was found from the field.

3.13 Limitations and Delimitations

In carrying out this study there were limitations and delimitation as explained below:

One of the factors was communication difficulty among participants of the study for data collection. Interviewing them was a bit challenging because of speech problem they have. This was, however, mitigated by using the language which could be easily understood. The interview guide for learners was transtrated from English to Swahili. During interview session the researcher used a recorder to record the interview. The researcher repeated the answers from the participant to confirm if the first answer was correct.

The study was conducted in two secondary schools in Dar-es-Salaam city, this limited the researcher in exploring other use of assistive technology by learners with cerebral palsy in other schools.

CHAPTER FOUR: PRESENTATION AND DISCUSSION OF RESULTS

4.1 Introduction

This chapter presents the data, interprets and discusses the results of the use of assistive technology by learners with cerebral palsy in secondary schools in Dar-es-Salaam city, Tanzania. The process has been guided by the study objectives that include: Availability of assistive technologies used by learners with cerebral palsy in secondary schools, the use of assistive technologies by learners with cerebral palsy in secondary schools, and the hindrances of the use of assistive technologies by learners with cerebral palsy in secondary schools.

In presenting findings, verbatim statements from participants have been used to maintain the originality of the information collected. In each section, the presentation starts, the interpretation of findings follows and the discussion of the same findings ends.

To keep confidentiality, the names of participants were not used. Participants were instead provided with codes. The codes for learners were L1, L2, L3, L4, L5, L6, L7 and L8. There were four teachers coded as T1, T2, T3 and T4 and for headteachers, the codes were H1 and H2. The results have been presented and discussed according to the themes and sub-themes developed from the data collected.

4.2 Demographic characteristics of participants

4.2.1 Sampled participants and respondent participants

This section described the characteristics of sampled participants and respondent participants of the study.

Table 2: Demographic characteristics of sampled participants and respondent participants

Category	**Gender Sampled**		**Total Sampled**	**Gender participated**		**Total participated**
	Male	Female		Male	Female	
Learners	7	4	**11**	4	4	**8**
Teachers	2	2	**4**	2	2	**4**
Headteachers	2	00	**2**	2	00	**2**
Total	**11**	**6**	**17**	**8**	**6**	**14**

Table 2 above indicated the sampled participants and participants who responded to the study. The study targeted learners with cerebral palsy, teachers trained in special needs education and headteachers in secondary schools. The total sample size of participants expected was 17 comprising 11 learners with cerebral palsy, 4 teachers trained in special needs education and 2 headteachers. Not all sampled participants were interviewed. A total of 3 learners with cerebral palsy were absent and therefore did not participate in the study. Reports indicate that they were sick and went back home for treatment.

4.2.2 Headteacher characteristics

This section described the characteristics of the headteachers who participated in the study.

Table 3: Headteachers' characteristics

Participants	**Gender**	**Qualification**	**Experience**	**Subject teaches**
Headteacher	Male	Degree in education	5 years	English and Kiswahili
Headteacher	Male	Degree in education	8 years	Economics

Table 3 above indicated that 2 headteachers were involved in the study. All headteachers were male respondents, and both of them had a degree in education. The experiences of these headteachers varied. While one had 5 years of experience working with learners with cerebral palsy and the other had 8 years of experience working with learners with cerebral palsy in that school. All the headteachers teach different subjects.

4.2.3 Characteristics of teachers

This section described the characteristics of teachers who participated in the study.

Table 4: Characteristics of teachers trained in Special Needs Education

Participants	Gender	Qualification	Experience	Subject teaches
Teacher 1	Male	Bachelor of Special Needs Education	10 years	Geography
Teacher 2	Female	Bachelor of Special Needs Education	6 years	Kiswahili
Teacher 3	Male	Bachelor of Special Needs Education	8 years	Civics
Teacher 4	Female	Bachelor of Special Needs Education	9 years	English and History

Table 4 above indicates that out of the 4 teachers who participated, there were 2 men respondents and 2 female respondents. All the teachers (n=4) had a bachelor's degree in Special Needs Education, and they have 6 to 10 years of experience teaching learners with cerebral palsy. All of them teach different subjects.

4.2.4 Characteristics of the learners with cerebral palsy

This section described the characteristics of learners with cerebral palsy who participated in the study.

Table 5: Characteristics of the learners with cerebral palsy

Participants	Gender	Characteristics of participants
Learner 1	male	walks without assistive technology has difficulties in speech
Learner 2	male	walks without assistive technology has difficulties in speech
Learner 3	male	is a wheelchair user and has difficulties in speech
Learner 4	male	is a wheelchair user and has difficulties in speech
Learner 5	female	is a wheelchair user, has speech difficulties and is hard of hearing
Learner 6	female	walks without assistive technology has difficulties in speech
Learner 7	female	walks without assistive technology has difficulties in speech
Learner 8	female	walks without assistive technology has difficulties in speech

Table 5 above indicates that out of the 8 learners, there were 4 female respondents and 4 male respondents. Five learners had speech difficulties and walk without assistive technology, one learner is a wheelchair user, has speech difficulties and is hard of hearing, and the other two learners were wheelchair users and they have speech difficulties.

4. 3 Availability of assistive technologies for learners with cerebral palsy

The study sought to establish the available assistive technologies for learners with cerebral palsy. The assistive technologies that are reported by the participants can be categorized as low-tech and high-tech assistive technologies.

4.3.1 Low-tech assistive technology

This section described the low-tech assistive technologies which were available in the areas of the study.

Table 6: Low-tech assistive technology available in the schools

Category of assistive technology	**School "A"**		**School "B"**	
	Number available	Number of users	Number available	Number of users
Wheelchairs	32	1	25	2
Crutches	12	0	18	0
Adapted desks	2	2	3	3
Artificial legs	5	0	8	0
Spectacles (sunglass)	6	0	3	0
Hearing aids	0	0	3	0

Table 6 above shows the low-tech assistive technologies available in both schools. The available low-tech were wheelchairs, crutches, adapted desks, artificial legs, spectacles and hearing aids. While all the low-tech devices were reported in all schools, hearing aids were reported in only one school.

The observation was carried out to ascertain the number of low-tech assistive technologies in each school. The findings indicate that school "A" had 32 wheelchairs, of which one is used by a learner with cerebral palsy while school "B" had 25 wheelchairs and two are used by learners with cerebral palsy. There were 12 crutches in school "A" while school "B" had 18. Adapted desks were 2 in school "A" while school "B" had all desks were adapted and are used by learners with cerebral palsy. Artificial legs were 5 in school "A" while school "B" had 8 artificial legs. There were 6 spectacles (sunglasses) in school "A" while school "B" had 3 spectacles. Hearing aids were observed in school "B" only.

When participants were asked whether they were aware of the assistive technologies available in their schools, they mentioned some of the devices. None of them listed all the devices as provided in the table. Indicating that they were not fully aware of the available devices in their schools. One of the participants had this to say: "*Teknolojia saidizi zinazopatikana hapa shuleni*

kwetu ni viti mwendo na magongo" (L 7) Literally meaning, the assistive technologies which are available in our school are wheelchairs and crutches.

Another participant responded: "*Assistive technologies that the school has are wheelchairs and crutches for learners with disabilities"*(T 3).

In addition to that, another participant explained:

> In this school, we have hearing aids, wheelchairs, and clutches which are used by different learners according to their needs. This school receives many children with different disabilities such as physical impairment, cerebral palsy, hearing impairment, and Albinism (T 2).

The results above show that schools have few low-tech assistive devices that are used by learners with cerebral palsy. There are only wheelchairs and adapted desks which were used by learners with cerebral palsy in all schools. The schools could have a variety of low-tech assistive devices to accommodate the needs of all learners with cerebral palsy in the school.

The findings indicate that there were few low-tech assistive devices available in schools of the study. This is because the low-tech assistive are readily available in the environment; easily manufactured, inexpensive and do not need more training on using them. As observed by Ahmed (2018), low-tech assistive technologies are simply designed and do not require more training during use. Ahmed identifies items such as pencil and pen grips, eyeglasses, wheelchairs, crutches, writing and reading stands, and adapted desks as low-tech assistive devices. According to Viner et al., (2020), low-tech assistive devices are low-cost devices that are easily accessible and simple to produce. They identify these assistive technologies as using pictures for communication, modified eating utensils, pencil grip, using special paper to help learners to read and write, head pointers, and whiteboards. While this is so, many learners did not know that some of the items they were using were categorized as low-tech devices.

The results show that the low-tech assistive devices used by learners with cerebral palsy in the schools were only wheelchairs and adapted desks. However, many researchers (Coulon (2015); Ahmed (2018); Viner et al., (2020); Lohmann et al., (2019); and Jacobsen (2012) point out different low-tech assistive technology which can be used by learners with cerebral palsy such as pictures for communication, page-turners, modified eating utensils, pencils and pens grip, using special paper to help learners to read and write, head pointers, whiteboards, eyeglasses, crutches, writing and reading stands, recorded lessons, recorders, eye gaze boards, alphabet boards, mouth sticks, and walking frame which can be used by learners with cerebral palsy.

This indicates that learners with cerebral palsy may not be receiving the support they need as part of the reasonable accommodations to engage in school activities that leaves them disadvantaged. Schools including parents, teachers, professionals and other stakeholders must try as much as possible to have these low-tech assistive technologies to ensure the active participation of learners with cerebral palsy in school. What is promising is that learners are using the available devices to facilitate their participation in learning and social activities.

4.3.2 High-tech assistive

This section described the high-tech assistive devices which are available in the areas of the study

Table 7: High-tech assistive technology available in the schools

Assistive technology	**School "A"**		**School "B"**	
	Number available	**Number users**	**Number available**	**Learners users**
Laptop	2	0	3	3
Computer desktops	1	0	1	0
Printer	1	0	1	0
Projector	1	0	1	0
Washing machines	0	0	2	7

Table 7 above shows the high-tech assistive technologies available in both schools. The available high-tech were laptops, computer desktops, printers, projectors, and washing machines. While all the high-tech devices were reported in all schools, washing machines were reported in only one school.

The observation was carried out to ascertain the number of high-tech assistive technologies in each school. Findings indicate that in school "A" there were 2 laptops which are not used by learners with cerebral palsy while school "B" had 3 laptops which are used by learners with cerebral palsy. There was 1 computer desktop and printer in each school which are used by teachers to prepare notes for learners. The projector was also available in each school but used rarely by teachers for teaching. The washing machines were observed in one school and were not working.

When asked whether they were aware of the assistive technologies available in their school, participants were able to mention some of the devices though none of them listed all the devices as provided in the table.

The responses below explain what participants said about the high-tech assistive technologies available in the schools:

One of the participants had this to say: *"The school has assistive technology such as a computer, printer, and projector for learners with disabilities"* (H 1).

Similarly, another participant responded: "*In our school, we have assistive technologies such as printers, computers and a projector for learners with disabilities" (T 4).*

In addition, another participant said: *"Kompyuta na mashine za kufulia ndivyo vifaa vya teknolojia saidizi vilivyopo hapa shuleni kwetu"* (L2). *[Computers and washing machines are assistive technology equipment available at our school]* (L 2).

The results above indicate that schools have few high-tech devices that are used by learners with cerebral palsy, and at least in school "B" some learners were using some of the devices directly compared with learners in school "A". The findings also suggest that whereas there is a range of high-tech assistive devices that the schools could have for the use of learners with cerebral palsy to meet their needs, the schools have only laptops, computer desktops, printers, projectors and washing machines. Coleman (2011), explains high-tech as electronic or mechanical such as computers with assistive software that increase physical access, the capacity for communication and performing academic tasks. Likewise, Zupan and Jenko, (2012) describes high-tech assistive technology such as computerized communication systems such as Augmentative Alternative Communication (AAC) iPad, smartphones and powered recreation. Also, Viner et al (2020) describe high-tech as assistive technology that is more sophisticated and usually programmable such as computers with extended keyboards and modified screens, it can be hardware or software.

In reality, learners with cerebral palsy are affected differently and they have different needs as a result, they require the use of different high-tech assistive devices in school. Based on the observations from the findings, it means that high-tech assistive technologies are very important for learners with cerebral palsy in school and yet they are not readily available for use. This is contrary to the HAAT model explains that assistive technology is the external enabler that helps a person with a disability (learner with cerebral palsy) uses to participate in an activity (Giesbrecht, 2013). Learners with cerebral palsy could be missing a lot due to the absence of these significant assistive technologies in schools. Therefore, there is a need to have a variety of these high-tech assistive technologies in schools to provide a higher advantage to learners with cerebral palsy.

4.4 How Learners with cerebral palsy use assistive technologies

This section sought to examine how learners with cerebral palsy use assistive technologies in secondary schools. The emerging issues were the use of assistive technology by learners with cerebral palsy for academic and non-academic issues.

4.4.1 The use of assistive technology by learners with cerebral palsy for academic

Assistive technology is a very important resource for the educational issues of learners with cerebral palsy. Learners with cerebral palsy are using assistive technology devices to carry out academic activities such as learning which includes writing, reading, personal study and doing mathematics as well as communication related issues.

Assistive technologies were found to be used by learners with cerebral palsy for different learning activities. When participants were asked how learners with cerebral palsy use assistive technology, a number of them reported that assistive technology is used for reading, writing, personal studies as well as doing mathematics works.

One of the participants had this to say: "*Computers were helping Learners with cerebral palsy in performing learning activities like writing and reading"* (H 1)

Another participant said:

> We established late that there are learners with cerebral palsy who cannot be able to hold a pen or a pencil and write but when they get assistive technologies like a laptop, they become more helpful. You find that with the laptop they can read, write and respond to the question they are given in class. In addition to that for the laptop, some can type their work (H 2).

Another participant responded: *"Binafsi namshukuru Mungu kompyuta mpakato inanisaidia sana, naitumia kwa kutunzia nukuu za masomo, kuandika majaribio pamoja na mitihani"* (L 2). [Personally, I thank God that the laptop helps me a lot, I use it for keeping lesson notes, and writing tests and exams (L 2)]

Another participant said:

> Kompyuta mpakato inanisaidia kuandikia na kusoma nukuu zangu za masomo pamoja na kufanya hisabati. Bila hiki kifaa saidizi sijui ningefanyaje kwa sababu sina uwezo wa kuandika kwenye daftari kwa kutumia kalamu (L 7).
>
> The laptop helps me write and read my lesson notes as well as do mathematics. Without this assistive device, I don't know what I would do because I am unable to write in *an exercise book by using a pen* (L 7).

Another participant expressed:

> Kompyuta mpakato inanisaidia sana kwa kuandikia na kuhifadhia nukuu za masomo pamoja na kuweka kazi zangu mwenyewe. Ninaitumia wakati wote kwa kuandika na kusoma kazi nilizohifadhi (L 1).
>
> The laptop helps me a lot in writing and keeping lesson notes and my work. I use it all the time for writing and reading the saved work. (L 1)

The findings show that assistive technology is used for many learning purposes at school by learners with cerebral palsy. However, findings also indicate that there are some learners with cerebral palsy who do not use assistive technology although they would like to use it. Yet most of them do not know how to use assistive technology such as gadgets.

Findings from the observation exercise revealed that learners with cerebral palsy use assistive technology for the mentioned learning activities above.

This is in line with the HAAT model which emphasises learners' use and access to appropriate assistive technologies. Similarly, Ahmad (2014) observes that assistive technology is used as a tool for accessing the curriculum which helps learners with disabilities particularly learners with cerebral palsy to perform academic tasks such as reading, writing and doing mathematics. Equally, Maor et al., (2011) elaborate that assistive technology has the potential to improve the performance of learners with special needs in primary and secondary schools in reading, spelling, writing, and speech skills. However, Lersilp et al., (2018) in their study observed that not all learners use the assistive technologies that are available at school.

Assistive technology enables learners with cerebral palsy to participate in school activities. They can learn well when provided with assistive devices that can help them in their learning. If learners with cerebral palsy lack assistive devices, it is clear that they cannot be able to learn well and participate in school activities. Therefore, it is very important to empower them by providing assistive technology that can help them to participate in school activities.

In facilitating communication for learners with cerebral palsy, assistive technologies were found to render an opportunity for the learners to communicate with others at home and in school environments.

When participants were asked how learners with cerebral palsy use assistive technology, most of them reported that assistive technology is used for communication.

One of participants had this to say:

> "Teknolojia saidizi naitumia kwa ajili ya mawasiliano. Mimi nikiwa nyumbani mara nyingi nawasiliana na ndugu zangu kwa kutumia simu, hata kama hawapo nyumbani wanajua kwa wakati huo nahitaji kitu gani. Ila hapa shuleni haturuhusiwi wanafunzi kuwa na simu ingawa kwetu ni muhimu kwa mawasiliano." (L 7)
>
> I use assistive technology for communication. When I am at home, I often contact my relatives by using a phone, even if they are not at home, they know what I need at that time. But here at school, we, students are not allowed to have phones even though it is very important for us for communication. (L 7)

Another Participant said:

> Mawasiliano ni mojawapo ya matumizi ya teknolojia saidizi. Mimi napenda sana niwe natumia simu hapa shuleni au nyumbani. Ingawaje watu wanafikira kuwa simu siyo nzuri kwa wanafunzi ila kwangu mimi naona sisi wenye ulemavu wa aina hii simu ni muhimu kwa mawasiliano (L 2)
>
> [Communication is one of the uses of assistive technology. I like to use the phone when I am at school or home. Although people think that the phone is not good for students, but for us with this type of disability the phone is important for communication]. (L 2)

Another participant said:

> Assistive technology has various uses including communication. Some learners have the challenge of speaking, sometimes they use their computers to express themselves or answer questions through writing to inform or express feelings to others (T 1).

Another participant said:

> Learners with cerebral palsy are using assistive technology to communicate with their friends and teachers. We used to have a learner who wanted to make stories with his friends but had speech difficulties. He used to write the whole story on his laptop and give one of his friends to read it to others. (H 2)

The results indicate that the use of assistive technology by learners with cerebral palsy is for communication. This was revealed by the responses of the participants who explained how assistive technologies help them in communication. In the same way, Zupan and Jenko, (2012) explained that learners with cerebral palsy who are nonverbal or whose speech is difficult to understand can benefit from utilizing a communication assistive device. They continued to say that individuals can communicate more successfully and readily with the help of Alternative Augmentative Communication (AAC) technologies such as; voiced word processing, symbol systems, programmable switches, electronic communication devices, speech synthesizers, recorded speech devices, communication improvement software, communication boards (a board with pictures representing a person's daily needs), and voiced word processing. With the help of this technology, learners with cerebral palsy may be able to talk more easily, feel more independent, and participate in activities with others.

Assistive technology not only that helps learners with cerebral palsy to easily and quickly understand the lecture material provided in class but also, it helps improve their communication skills when interacting with the surrounding environment. Assistive technology also, helps to enable interpersonal communication skills among learners.

4.4.2 The use of assistive technology by learners with cerebral palsy for non-academic

Assistive technology is a very important resource for non-academic issues for learners with cerebral palsy. Learners with cerebral palsy use assistive technology devices to carry out non-academic activities including; mobility, leisure and seating.

Assistive technology is a means of enhancing mobility and interaction for learners with cerebral palsy at schools. They become happy when they are able to move from one place to another, socialize with their classmates and participate in school activities due to the help of the assistive technologies. When participants were asked how learners with cerebral palsy use assistive technologies for non-academic issues, a number of them explained that assistive technology is used by learners with cerebral palsy for mobility.

One of the participants had this to say:

> In case of the wheelchair, they use them for mobility with the help of their friends and classmate because they can't be able to ride themselves. The wheelchairs help the learners to move from one place to another (H 1).

Another participant said:

> Learners with cerebral palsy who are wheelchair users use that assistive technology for all their movements at school with the help of their fellow learners who help them to push their wheelchair (T 2).

Another responded that:

> Wheelchair helps learners with cerebral palsy to move from one place to another, such as; from dormitory to classroom, cookery room, computer lab, biology lab, chemistry lab, and physics lab and go back to the dormitory (T 4).

Another participant said: *"Kiti mwendo kinanisaidia kutembea kutoka bwenini kwenda madarasa na kurudi bwenini"* (L 3).

The wheelchair helps me move from the dormitory to classes and back to the dormitory (L 3).

Yet another relatedly said: "*Kiti mwendo hunisaidia kutembelea sehemu mbalimbali hapa shuleni kama vile darasani, bwenini, uwanja wa mpira wa miguu, na sehemu nyinginezo."* (L 4)

The wheelchair helps me to visit different places here at schools such as the classroom, dormitory, football ground, and other places. (L 4)

Similarly, another participant said:

> Namshukuru sana Mungu kwa usaidizi wa marafiki na wanafunzi wenzangu wanaonisaidia kusukuma kiti mwendo ili niweze kwenda maeneo mbalimbali ya shule. Kiti mwendo kinanisaidia kutembea kutoka bwenini kwenda madarasani, maabara, uwanja wa michezo, ofisi ya mwalimu, kurudi bwenini na wakati mwingine kwenda hospitali. (L 5)
>
> I thank God very much that, with the help of my friends and classmates they push me on my wheelchair so that I can go to different places in the school. The wheelchair helps me to move from the dormitory to the classrooms, laboratory, playground, teacher's office, back to the dormitory and sometimes to the hospital.

The findings from observation revealed that learners with cerebral palsy use manual wheelchairs only for their mobility in school. They are not able to use the wheelchair themselves but with the help of their friends or classmates, they use it for mobility to the classrooms and to other school environment.

The results from the respondent indicate that wheelchairs are very important assistive technology which helps learners with cerebral palsy move from one place to another and enable them in engaging in school activities. It was found that the use of wheelchairs can improve a person's mobility and their ability to complete daily tasks. Ahmed, (2018) stated that learners with cerebral palsy may need a wheelchair to allow them to engage and interact with their peers during performing school activities. He continues to say wheelchairs as mobility aids can increase self-confidence and feelings of safety to learners with cerebral palsy, which helps them to achieve the highest level of independence in their lives. In addition, Raya et al., (2012) state that wheelchairs as assistive technology for mobile devices are most used by persons with cerebral palsy in everyday activities.

Assistive technology enhances accessibility to entertainment and enjoyment opportunities by the learners with cerebral palsy. Learners with cerebral palsy get opportunities to watch moves, play games and other sports such as football and they can entertain themselves through music. When participants were asked how learners with cerebral palsy use assistive technology for non-academic activities, a number of them reported that assistive technology is used for leisure.

Assistive technologies were found to be used by learners with cerebral palsy in different learning activities. When participants were asked how learners with cerebral palsy use assistive technology, a number of them reported that assistive technology is used for reading, writing, personal studies as well as doing mathematics works.

One of the participants had this to say:

> Mimi napenda sana kucheza game (akacheka kidogo) mimi huu ulemavu wangu sijafundisha kucheza mchezo wowote. Ila wakati wa likizo nikiwa nyumbani natumia sana simu ya dada kucheza game ambae ndiye alinifundisha ingawa siku hizi mimi najua kuliko yeye (L 8).
>
> I like to play games (laughed a little) I have not been taught to play any game because of my disability. But during the holidays, when I'm at home, I use much my sister's phone to play the game that she taught me, even though these days I know better than her (L 8)

Another participant said:

> In the beginning, when we provide laptops to our learners, we did not fully understand these learners. This is because there was a time when we used to take the laptops from them and we found that they had saved the movie. We sat with them and told them that instead of using the technological equipment we gave them for their school affairs, they just watch movies. One learner said that they don't watch movies all the time, but they watch them during the weekend as part of their leisure (H2).

Another participant said:

> Assistive technology is a source of their game and sport because there are learners these days whom you find doing a physical exercise where it was not their norm. When I asked them why these days they struggle with physical

> exercise, they said that they learned to do physical exercise over the television while on vacation at home (T 1).

Assistive technology in schools is often treated as a learning device only. However, there are other uses that learners with cerebral palsy can do as part of sports and entertainment. Learners can use the laptop for watching moves, playing games or watching football. It is good for schools to allow them to use their assistive technology for leisure.

The results evidenced that learners with cerebral palsy use assistive technology for leisure though before teachers thought that the learners were using the devices for non-academic issues. This is in line with Shikden (2015) who elaborates that persons with disabilities including learners with cerebral palsy can participate in physical education, sports and recreational activities. Shikden explains that this is only possible through the use of adapted physical education and changing rules in adapted sports. The assistive devices include adapted wheelchairs, computer games, computer simulations, adapted puzzles, audio descriptions of movies, sporting, and cultural events, games, television, audiotape players, multimedia software and tools, internet technology and computer software and hardware.

Assistive technologies are imperative for seating learners with cerebral palsy. Seating is very significant for the life of everyone including learners with cerebral palsy. They can use wheelchair to seat when; doing academic tasks in and outside classrooms, watching movie and eating. When participants were asked about the use of assistive technologies by learners with cerebral palsy for non-academic use, they reported that learners with cerebral palsy use assistive technology for seating.

One of participants had this to say:

> Kiti mwendo ni kila kitu katika maisha yangu. Ninakitumia kwa shughuli zote isipokuwa usiku nikilala. Hiki ndicho kiti changu ambacho nakikalia muda wote ninapoachana na kitanda, hivyo kina thamani kubwa sana kwangu. (L 5)

> The wheelchair is more important in my life. I use it for all activities except at night when I sleep. This is the chair that I sit in all the time when I leave the bed, so it is of high value to me.

Another participant said:

> Learners with cerebral palsy who are wheelchair users utilize this device as a seat in the classroom and outside. When they are writing, eating and playing they seat on the wheelchair (T 2).

The results indicate that wheelchairs are assistive technology that are always used for seating by the learners with cerebral palsy in schools. The findings are in line with Bousquet and Agustsson, (2021) who observe that persons with cerebral palsy use assistive devices for sitting than lying or standing. Wheelchairs as assistive devices were used for seating by 57% more than other seating devices.

The wheelchair has been a savior for learners with cerebral palsy in their daily activities at school. The assistive technology has reduced challenges and accelerated participation of learners with cerebral palsy in various activities including school activities.

4.5 The hindrances of the use of assistive technologies by Learners with cerebral palsy

This section sought to examine difficulties that were facing learners with cerebral palsy in the use of assistive technologies in their learning. This section was vital because knowing the barriers associated with the utilization of assistive technologies by learners with cerebral palsy in secondary schools could help to ascertain solutions to strengthen their use and consequentially lead to better learning. When the question was posed to participants, the majority of them reported variably including; shortage of assistive technology, limited knowledge, training, infrastructure, Lack of awareness, shortage of funds, and attitude. They have been analyzed here below:

Table 8: The hindrances of the use of assistive technologies by learners with cerebral palsy

Hindrances	The number of participants reported
Shortage of assistive technology	14
Limited knowledge	12
Training	12
Infrastructure	6
Lack of awareness	6
Shortage of fund	2
Attitude	2

Table 8 above presents the following emerging issues as reported by participants as far as hindrances are concerned: The shortage of assistive technology (n=14), limited knowledge (n= 12), training (n =12), infrastructural (n=9), lack of awareness (n=6), shortage of fund (n=2), and attitude (n=2). Details of what participants stated verbally are presented below

Shortage of some of the important assistive technologies was reported by participants (n=14) as a challenge towards assistive technology use for learning by learners with cerebral palsy in secondary schools. From the expression of the participants, it was noted that assistive technologies were scarce as compared to the number of learners let alone the needs of learners who needed them for learning. One participant said:

> Assistive technologies are not enough for the needs of all learners with cerebral palsy and other disabilities. Learners with cerebral palsy who have a personal laptop can use it for learning. The government should bring a variety of assistive technologies (T 4).

Another participant had this to say:

> Assistive technologies are not enough to compare with the number of learners with disabilities in the school. Learners with cerebral palsy don't have personal laptops which can assist them in learning (T 1).

Similarly, one other participant confirmed:

> The assistive technologies are very important for learners with cerebral palsy, but they are not enough for the needs of all learners in the school. Therefore, the government should make sure that all learners with cerebral palsy access assistive technology according to their needs (T 2).

Another participant said:

> Ninapenda kutumia kompyuta mpakato, lakini sina. Kompyuta mpakato ingenisaidia kutunza kumbukumbu za masomo, kuandika majaribio na mitihani. Kinasa sautinacho ni muhimu, ninakipenda kwa sababu kingenisaidia sana kurekodi kila kitu anachofundisha mwalimu au majadiliano na wanafunzi wenzangu (L 2).
>
> I like to use a laptop but I don't have one. The laptops can help me to keep notes and write tests and exams. A tape recorder is very important. I like it because it would help me a lot to record everything the teacher teach or discuss with my classmates. (L 2)

Another participant had this to say:

> Huh! According to the learners' disabilities, they have different needs and abilities. The school does not have enough different types of assistive technologies which can cater for the needs of learners with cerebral palsy (H 1).

Another participant said:

> The school don't have garget like tape recorders, page turns and writing stands therefore which are very important to learners with cerebral palsy. The government should provide more garget according to the needs of learners with cerebral palsy (H 2).
>
> In our school, we don't have assistive technology like a tape recorder, but learners with cerebral palsy need to use it. It helps them to record the lesson when the subject teacher is teaching or in their discussion and later, they use it for personal reading. (T 3)

Another participant said:

> "Kwa sasa naandika kwenye daftari kwa kutumia kalamu lakini naandika polepole sana. kwahiyo siwezi kuweka mambo mengi kichwani mtihani ukija napata shida. Ningekuwa na kifaa cha kurekodia kingenisaidia kupata vitu vingi darasani na kusikiliza baadaye kungenisaidia kuelewa Zaidi." (L 4)
>
> At the moment I am writing in a notebook using a pen but I am writing slowly. So, I do not put many things in my head when the test comes and I have a problem. I would have a recording device that would help me get a lot of things in the classroom and listening later would help me understand more. (L 4)

Another participant said: *"Shule zinapaswa kuwa na aina tofauti za teknolojia saidizi kama vile simu na vinasa sauti ambavyo vitatusaidia kurekodi wakati mwalimu anafundisha na sisi kuendelea kusikiliza tukiwa nje ya darasa"* (L 8)

> The school should have other assistive technologies like a phone and recorders which will help us to record when the teacher is teaching and we listen outside the classroom (L 8).

The findings above reveal that most of the schools are not well equipped with necessary assistive technologies that are very important for the learning of learners with cerebral palsy. The findings uncover the truth that whereas some of the equipment are available a good number of assistive technologies, more especially modern ones such as laptops, digital tape recorders are not available or less are available in schools. On the other hand, the participant's expression point out that some of the available assistive technologies do not cater for the varying needs of learners with cerebral palsy.

This is contrary to Al-Qudah et al., (2014) who observed that learners with cerebral palsy suffer from language problems due to brain damage, and also motor difficulties that prevent them from using a standard mouse or keyboard on a computer. Their learning can be enhanced by using iPads, spectacles, mouth controls, and eye control making the computers they use specialized to their needs without compromising the content. Similarly, Doush and AlMeraj (2019) point out that assistive technologies such as iPads can be used to help learners with communication problems like learners with cerebral palsy who have difficulties in speech resulting from the effects of cerebral palsy on their muscles. They continued to say that augmentative and alternative communication helps persons with communication problems to complete his/her daily activities. They explain that children are helped by augmentative and alternative communication tablet application that uses pictures on the screen and voice feedback.

Another emerging issue was on the limited knowledge among learners with cerebral palsy about assistive technologies; mainly available for them and how to utilize them during learning. When participants were asked, a number of them (n=5) expressed that a number of learners lacked knowledge which is a barrier in itself. This participant had this to say:

> Dah! learners with cerebral palsy join secondary school without the knowledge of the use of assistive technology such as computer desktops or laptops as a result instead of a teacher starting teaching the lesson, they find a way of helping them with how they're going to learn (H 1).

Another one responded:

> Learners with cerebral palsy join secondary school without the knowledge of how to use a computer and other assistive technology. This is a big challenge for us teachers, we want our learners to participate fully in learning but is impossible (T 2).

Another participant had this to say: *"Sijui jinsi ya kutumia kompyuta. Ninasikia kwamba ni vigumu sana kuweza kutumia kompyuta. Nitafanya bidii ya kujifunza hadi niweze kuitumia". (L 5)*

[I don't know how to use a computer. I heard that it is difficult to use a computer until you learn how to use it (L 5)].

Another participant said: *"Mimi sijui kutumia komputa mpakato lakini nikifundishwa nitafanya bidii ya kujifunza mpaka niweze." (*L 3)

[I don't know how to use a laptop but if I will be trained, I will make an effort until I can be able (L 3)].

Another emerging issue related to the above is on the limited knowledge of teachers on the use of some of the assistive technologies as well as lacking knowledge on how to teach learners with cerebral palsy to use the available assistive technologies in order to enhance their learning. This participant said:

> You see, on the side of teachers, they know about using assistive technology like computers. The challenge is how to teach learners with cerebral palsy the use of that kind of assistive technology. Teachers lack knowledge because there are not

> trained on how to train learners with cerebral palsy who have different needs and abilities to use assistive technology (H 2).

The above findings and expression suggest that learners with cerebral palsy are eager to use assistive technologies in their learning but they are hindered by the lack of knowledge on how to operate them. Thus, regardless of the inadequacy of assistive technologies in schools, teachers and learners with cerebral palsy have little or no knowledge or skills of using the few available assistive technologies. This is because most learners have poor background on the use of assistive technologies from primary education. It is also true that teachers are not able to assist learners with cerebral palsy by training them how to use assistive technologies. This is due to the fact that they are not trained in this area. This whole situation deprives learners with cerebral palsy the right to access the learning in equal basis with others because they cannot access the quality education as accessed by others.

The finding is in line with Moreno et al., (2021) who point out the need for individualized support; the need to promote the skills development of the professionals (teachers) working with children with disabilities including those with cerebral palsy; the accessibility of spaces and adaptation of programmes as well as developing training courses that promote inclusion of learners with cerebral palsy. Similarly, Chukwuemeka and Samaila (2020) observe that teachers' competency and skill in the use of assistive technology to teach learners with disabilities are so important that we cannot talk about the use of technology without knowing how effective the teachers are using it. Besides, Connor and Beard (2015) say that several teachers do not use the technology which is available for the reason that they don't know how to use the devices. This is because

they are still challenged that assistive technology is normally used by only those who are attending specialized training.

To ascertain the above, a researcher was interested to know why learners and teachers have limited knowledge. When asked, some of the participants revealed that the main challenge here is lack of training in using the assistive technologies both to teachers and leaners with cerebral palsy. One participant said: *"Sijui jinsi ya kutumia kompyuta lakini nikifundishwa nitajua jinsi ya kuitumia na hii itanisaidia sana"* (L 4).

[I do not know how to use a computer but if I am trained, I will know how to use it and this will help me very well].

Another participant recounted:

> Ninapenda kufundishwa kutumia kompyuta. Unaona ulemavu wangu siwezi kufanya chochote mimi mwenyewe mpaka mtu anifanyie, nilitakiwa kufundishwa shule ya msingi jinsi ya kutumia kompyuta lakini haikuwa hivyo (L 5).
>
> [I like to be trained on how to use a computer. You see my disability I cannot do anything myself until someone do it for me. I was supposed to be trained in primary school on how to use a computer but it was not].

Another participant said:

> Special Needs Education teachers should be trained on how to teach learners with cerebral palsy to use assistive technologies. Also, learners with cerebral palsy should be trained to use assistive technology in primary school (T 4).

This participant responded:

> Teachers should be trained on how to train learners with cerebral palsy to use assistive technologies and those learners should be trained early on using assistive technologies in primary school (H 2).

The statements above reveal that learners lack knowledge of using assistive technologies because they do not receive trainings in their early education such as in primary schools. On the other

hand, the findings unfold the truth that teachers who are specifically trained to teach learners with cerebral palsy in the name of special needs education teachers do not have adequate knowledge and skills in both using the assistive technologies and training learners to use the assistive technologies. This hinders the effective use of assistive technologies by learners with cerebral palsy and consequently face accessibility challenges in their learning.

The above findings contradict the Coleman (2011) point of view. Coleman points out that teachers of learners with physical disabilities (including learners with cerebral palsy) should be given training in assistive technology so that they know how to teach those learners to use assistive technology and be trained to ensure that they meet the needs of their learners. In addition, Ahmad (2014) observed that learners must be trained to use the assistive technology to be able to use it effectively.

Another issue emerged as the hindrance towards the use of assistive technologies was the poor infrastructure. To ascertain on this issue, the researcher posed a question and most of the participants (n=6) were quick to observe that infrastructure such as internet, electricity, libraries, classrooms do not allow the utilization of assistive technologies by learners with cerebral palsy. One of participant said:

> Miundombinu ya hapa shuleni siyo rafiki kwetu sisi tunaotumia viti mwendo. Uongozi wa shule umejitahidi kuweka ngazi mtelezo kwenye baadhi ya maeneo lakini kwingine imeshindikana. Huwezi kuamini kuna baadhi ya madarasa siwezi kuingia na kiti mwendo changu mpaka nibebwe na wanafunzi wenzangu(L 4).
>
> [The infrastructure at our school is not friendly to us who use wheelchairs. The school management has tried to put up ramps in some places but it has failed in other places. You won't believe there are some classes I can't enter with my wheelchair until I'm carried by my classmates].

Another one stated:

> Hapa shuleni kwetu hakuna mtandao ambao ungetuwezesha kupata maarifa mengi ya kujifunzia. Maana wenzetu wasio na ulemavu huwa wanatwuambia kuwa wakiwa nyumbani wanapata maarifa mengi kutoka google, wenyewe huwa wanaiita maktaba inayotembea". (L 5)
>
> [Here in our school, there is no internet to enable us to get a lot of learning materials. Our colleagues without disabilities always tell us that when they are at home, they get a lot of learning materials from google, they call it a mobile library].

Another participant recounted:

> For those who use wheelchairs, the school infrastructure is not friendly such as the classroom, the library, and the laboratory. Also, the damage to assistive technologies such as wheelchairs which caused by poor infrastructure. This limits the learners with cerebral palsy in using assistive technology (T 1)

Another participant had this to say:

> The school infrastructure is not conducive for example electricity is not available in classes and there are no sockets for charging laptops. This disrupts the use of laptops for a learner with cerebral palsy in class (T 2).

In relation to the above, it was also discovered that resource rooms or libraries for assistive technologies; for instance, computer laboratories were not accessible by learners with cerebral palsy any time they needed to use them. When asked, one participant reported by saying:

> Access to assistive technology the whole time is limited to learners with cerebral palsy due to the computers being found in the teacher's office only. When learners are in the dormitory, they cannot access computers due to the dormitory infrastructure are not conducive (H 1).

The findings above bring an impression that the schools have unfriendly infrastructures such as inaccessible classrooms for learners with cerebral palsy using wheelchairs. The internet was reported to be not available in the schools. The results uncover a very important issue of having some of the assistive technologies in teachers' offices due to lack of specially constructed resource rooms and libraries. As a result, learners fail to have access to them at all times for learning opportunities . Likewise, electricity was reported as one of the challenges

towards utilization of the assistive technologies. It was discovered that most of the classrooms are not installed with electricity that could help to power the laptops and tape recorders when learners are attending lessons. Similarly, it was reported that electricity was not sustainable. All these hinder the utilization of assistive technologies for the better learning of learners with cerebral palsy. This negatively impacts the learning of learners with cerebral palsy in secondary schools.

The findings are in line with Goggin (2021) who says that many countries have restricted access to infrastructures such as digital libraries, the internet and assistive technology. In addition, Sholanke et al., (2019) explained that persons with physical disabilities are frequently marginalized as a result of inadequate accessibility facilities in public environments, including schools. Also, in their study observes that there was absence of ramps as an alternative to footsteps and stairways in some secondary schools.

Another emerging issue was the lack of awareness, more especially teacher's knowledge of which tools are available and suitable for learners with cerebral palsy, something that impedes teachers from using assistive technologies to facilitate the learning of learners with cerebral palsy in schools. When participants were asked, some of them (n=3) were very quick to admit that they had little or no awareness of assistive technologies they can use to teach and assist the learning of learners with cerebral palsy. One participant said:

> Learners with cerebral palsy are in different categories and have different needs. Sometimes we don't know which assistive technology they use. The teacher who trained in special needs were not trained in cerebral palsy and physical impairment (H 4).

Another participant said:

> Personally, sometimes I fail even how to help learners with this type of disability. The devices we have here at school are not used with all learners with cerebral palsy. I hear that there are different devices that they can use apart from the computer (T 3).

During interaction with the participants, there was another occurring issue that recognized parents as having a great role in the learning of learners with cerebral palsy. However, they were not aware of the assistive technology for use in assisting their children who have cerebral palsy. One participant had this to say:

> There is a parent who tries hard to monitor the academic progress of her child. Her child cannot do anything alone, she is depending on support from others. When I asked the parent about the assistive device she was using when she was in primary school. She replied with an unhappy face that she doesn't know (T 1).

The findings above provide an insight that one of the challenges that hinder teachers from effectively using the assistive technologies to facilitate the learning of learners with cerebral palsy is little understanding on the types of assistive technologies suitable, and how they can apply them in helping the learning of these learners. This is due to the aforementioned limitation in training of teachers, something which restricts teachers from having crucial information of which assistive technologies are suitable, how they can use them and how important they are for the learning by learners with cerebral palsy. Likewise, parents as great contributors in learning of these learners seemed to face the same. Thus, they are not aware of assistive technologies for their children with cerebral palsy. All this, hampers the utilization of assistive technologies in secondary schools; something which restrict learners with cerebral palsy from accessing quality education as sought by others in equal basis.

According to Umoeshie (2020) teachers' awareness of assistive technology is very important because it can help them in the school budget for government or donors, to make requests for purchasing and advising parents on the assistive technologies needed by their children. This

study aligns with that of Dwivedi (2020) who points out that a lack of awareness about newer and quality devices among professionals limit them to recommend an appropriate device needed. It is true that teachers without awareness of the availability of different assistive technology and the needs of learners with cerebral palsy put learnersa at a disadvantage. Thus, the use of assistive technology by all learners with cerebral palsy will be difficult.

There was another issue that emerged as a main hindrance overwhelming all the above. This was funding problems. Funding provided for the availability of assistive technologies, training of teachers and learners. Infrastructure also depends on good funding. Therefore, inadequate funding lowers the quality of all these. To ascertain this, the researcher posed questions to participants and some of them (n=2) did not hesitate to express that inadequate funding is a challenging issue toward the use of assistive technologies in secondary schools. One participant had this to say:

> The school budget is not enough to buy assistive technologies such as computer desktops, laptops, and wheelchairs among others for learners with disabilities. We depend on provided by the government, well-wishers and donors (T 3).

Relatedly, another participant responded:

> The school doesn't have the budget of repairing assistive technology like a wheelchair when is not functioning. As you know for learners with cerebral palsy those who are wheelchair users, the wheelchair is everything for them because they use it for the whole day therefore it needs service and repair (H1).

The findings indicate that schools are faced with funding challenges that emanates from inadequate budgets that cannot suffice to procure enough and suitable assistive technologies, more especially modern ones such as laptops, and desktop computer as well as wheelchairs. Likewise, repairing the available assistive technologies was an issue due to the fact that the budget is not allocated to serve that role. These results into inadequacy of suitable and well-functioning assistive technologies.

The finding is in line with Maraizu, (2014) who elaborates that inadequate educational funds affect the education of learners with disabilities and those with cerebral palsy inclusive. Maraizu goes on to say in the findings that there was lack of funds to purchase the necessary assistive devices needed by schools to cater for their learners' needs. Similarly, Dwivedi (2019) argues that the major challenge towards assistive use is lack of funds for repairing and maintenance of the device.

During the interviews, the researcher noted from participants (n=2) that pointed out the negative attitudes to be one of the hindrances towards use of assistive technologies to enhance the leaning of learners with cerebral palsy. When asked, participants explained that negative attitude of teachers and parents affected the use of assistive technologies. One participant expressed:

> Some teachers naturally do not want to use assistive technology themselves. They know how to use it but when comes to teaching learners with disabilities on using the assistive devices they bring excuses (H 1).

Another one recounted:

> There are some learners with cerebral palsy who come to school without assistive devices. Parents don't provide assistive technology to their children. They assume that is the government supposed to provide assistive technology to learners with disabilities in school. In my experience, many parents have a negative attitude toward providing assistive technology devices to their children with disabilities (T 4).

The findings indicate that though the use of assistive technology is crucial for the learning of learners with cerebral palsy in secondary schools, negative attitudes from stake holders especially teachers and parents may hinder its use. The findings unfold the truth that some teachers are skilled and have awareness on assistive technologies but they are reluctant to use them. Likewise, negative attitudes on the side of most parents who believe that the government is the only provider of the assistive technology, leads to inaccessibility of them. On the other hand, negative attitudes may be attributed to lack of awareness but on contrary, it may lead to lack of

awareness, something which restricts the effective utilization of assistive technologies for the learning by learners with cerebral palsy in secondary schools. This corresponds to Alkahtani (2013) who argues that teachers' negative beliefs and attitudes play an important role in their prevention of choosing or using assistive technology for learners with disabilities. This is in consonance with Flanagan et al., (2013) observes that teachers' attitudes were a significant predictor of teachers' choice or using assistive technology. Furthermore, Woodbury (2015) affirms that teachers have a negative attitude toward using assistive technology to teach learners with disabilities. They believe that using assistive technology in teaching is too time-consuming.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary, conclusion and recommendation. The suggestions for further research areas are also presented.

5.2 Summary of findings

This study revealed that schools having children with celebral palsy have adopted the use of low tech and high teach assistive technologies. Findings showed, however, that despite availablility of varieties of assistive technologies in the market, very few assistive technology are available in secondary schools. The assistive technologies available in the schools include wheelchairs, computers, some adapted desks and washing machines in one school. It was found that the computers that are not adapted to meet the needs of learnes with celebral palsy. The study also revealed that schools lack resource rooms where learners with cerebral palsy could go and do their work using the computers. It was found that instead learners with celebral palsy use the teacher's office.

The study revealed that the avaialbe assistive technologies were being used for different purposes. Most learners with cerebral palsy use assistive technology for academic issues such as learning and communication as well as for non-academic issues such as mobility, leisure and seating. The study found that some special education teachers use computers to write notes, tests and exams for learners and then print them out and give learners with cerebral palsy to use it.

The study revealed several hindrances such as shortage of assistive technology, limited knowledge, inadequate training, infrastructure, limited awareness, shortage of funds and attitude which face learners with cerebral palsy in using assistive technologies in secondary schools. The study found that learners with cerebral palsy join secondary school without the knowledge of

using assistive devices such as computers. Teachers also had limited knowledge to train learners with cerebral palsy in using assistive technology which is due to a lack of training specifically in the area of cerebral palsy.

5.3 Conclusion

Assistive technologies have been seen to be very essential in enhancing the ability of learners with cerebral palsy in schools. Schools involved in this study had teachers trained in special needs education . Teachers trained in special needs education were found to have limited knowledge of training learners with cerebral palsy to use assistive technology. These teachers needs planned training to enable them use the devices to support learners learning.

Secondary schools haveing learners with celebral palsy studies however, had shortage of assistive technologies as compared to the number of learners with cerebral palsy. The assistive technologies that were available in those schools did not cater for the different needs of learners with cerebral palsy. It would be good to adapt the assistive technologies so that they can be used to meet the academic and social needs of students with celebral palsy.

Learners with cerebral palsy were found to fail to use the available assistive technologies. They were found to lack the necessary knowledge to use the devices. It is important to train learners to use the devices to enable them to use them effectively for their learning and social participation.

5.4 Recommendations

Based on the strength of the findings and conclusions coming out of this study, the following recommendations are made:

1. The government should ensure that all secondary schools that have learners with cerebral palsy are provided with adequate assistive technology and devices after assessing the needs and abilities of those learners.
2. Each school should prepare and provide a continuous professional development training for teachers and school staff on the use of available assistive technologies so that to help learners with cerebral palsy access and use it.
3. Parents/guardians should be sensitized on the importance of the use of assistive technologies for learners of cerebral palsy and be well informed on where to access them so that they can be able to provide rightful assistive technologies for their children.
4. The government should provide funds to secondary schools that enroll learners with cerebral palsy for buying and repairing assistive technologies where necessary.
5. The Tanzania Institute of Education should put in Teacher training curriculum the content on how to use different assistive technologies so that all teachers coming out of the training institutions learn and help learners with cerebral palsy use them while at school.
6. The government should motivate non-government organizations to supporte learners with cerebral palsy by providing assistive technologies in secondary schools to help learners with cerebral palsy.

5.5 Suggestions for further research

Based on the findings of the study and the recommendations, I hereby suggest that:

1. More studies should be carried out that focus on the role of stakeholders in enhancing the availability of appropriate assistive technology for supporting learners with cerebral palsy to access learning in secondary schools.
2. This study could be replicated in primary schools focusing on the use of assistive technology by learners with cerebral palsy.

REFERENCES

Ahmad, F. K. (2014). *Use of Assistive Technology in Inclusive Education : Making Room for Diverse Learning Needs*.

Ahmed, A. (2018). Perceptions of using assistive technology for students with disabilities in the classroom. *International Journal of Special Education*, *33*(1), 129–139.

Akyurek et al. (2017). We are IntechOpen , the world ' s leading publisher of Open Access books Built by scientists , for scientists: Assistive technology in occupational therapy. In *Intech* (Issue tourism, pp. 149–180). https://www.intechopen.com/books/advanced-biometric-technologies/liveness-detection-in-biometrics

Al., S. Ø. et. (2005). The use and impact of assistive devices and other environmental modifications on everyday activities and care in young children with cerebral palsy. *Disability and Rehabilitation*, *27*(14), 849–861. https://doi.org/10.1080/09638280400018619

Al Ghurair, N., Alnaqi, G., & Doush, I. A. (2021). An AAC tablet application for children with language impairment. *Journal of Engineering Research (Kuwait)*, *9*(2), 106–123. https://doi.org/10.36909/jer.v9i2.9201

Alan Bryman. (2016). Social Research Methodos. In *Oxford University press*. https://doi.org/10.1007/978-0-230-22911-2

Babatope, I. E. & O. (2019). *A Basic Approach in Sampling Methodology and Sample Size Calculation*. *1*, 50–54.

Batanero et al. (2022). *Assistive technology for the inclusion of students with disabilities : a systematic review*.

Besio. (2004). *Using assistive technologies to facilitate play by children with motor impairments: Amethodological proposal. 16(3),* 119–130.

Borg, J. (2019). *Global perspectives on assistive technology Global perspectives on assistive technology* (Issue August).

Bousquet and Agustsson. (2021). *Postural Asymmetries and Assistive Devices Used by Adults With Cerebral Palsy in Lying , Sitting , and Standing*. *12*(December), 1–8. https://doi.org/10.3389/fneur.2021.758706

Casteel, A., & Bridier, N. L. (2021). *Discribing populations and samples in doctoral*. *16*, 339–362.

Chukwuemeka, E. J., & Samaila, D. (2020). Teachers' perception and factors limiting the use of high-tech assistive technology in special education schools in North-West Nigeria. *Contemporary Educational Technology*, *11*(1), 99–109. https://doi.org/10.30935/cet.646841

Coleman, M. B. (2011). Successful Implementation of Assistive Technology To Promote Access To Curriculum and Instruction for Students With Physical Disabilities Technology To Promote Access To Curriculum and Instruction for Students With. *Assistive Technology and Physical Disabilities*, *3*, 2–22.

Connor, C., & Beard, L. A. (2015). Increasing Meaningful Assistive Technology Use in the Classrooms. *Universal Journal of Educational Research*, *3*(9), 640–642. https://doi.org/10.13189/ujer.2015.030908

Coulon, K. (2015). *Exploring the Impact of Assistive Technologies in the Classroom for Students with Disabilities*.

Creswell. J.W. and Creswell, J. D. (2017). (2017). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches. 4th Edition, Sage, Newbury Park.*

Creswell, J. (2013). *Qualitative Research Inquiry Design: choosing among five approaches. London: Sage Publications*.

Dominic, S., Chukwuemeka, E. J., & ... (2020). Assessment of availability, adequacy and condition of high-tech assistive technology resources in special education schools in North West Nigeria. IJRISS. *International Journal of …*, *IV*(I), 185–190. https://www.researchgate.net/profile/Emeka_Chukwuemeka/publication/339000389_Assessment_of_Availability_Adequacy_and_Condition_of_High-Tech_Assistive_Technology_Resources_in_Special_Education_Schools_in_North-West_Nigeria/links/5e381d1b92851c7f7f18c8c3/As

Doush, I & AlMeraj, Z. (2019). *Evaluating the accessibiliy of Kuwaiti E-Government Websites*. *05*(January), 152–169.

Dwivedi, A. K. (2019). Exploring barriers to the use of assistive technology for PWDS in India. *Indian Journal of Physiotherapy and Occupational Therapy - An International Journal*, *13*(1), 6. https://doi.org/10.5958/0973-5674.2019.00002.9

Eligi, Innosencia & Mwantimwa, K. (2017). ICT accessibility and usability to support learning of visually-impaired students in Tanzania. *International Journal of Education and Development Using Information and Communication Technology*, *13*(2), 87–102.

Flanagan, S., Bouck, E. C., & Richardson, J. (2013). Middle school special education teachers perceptions and use of assistive technology in literacy instruction. *Assistive Technology*, *25*(1), 24–30. https://doi.org/10.1080/10400435.2012.682697

Gagani, R. F. (2019). Credibility in Qualitative and Quantitative Research in Education : A Humean Approach. *American Journal of Humanities and Social Sciences Research*, *3*(6), 134–139.

García, T. P., Loureiro, J. P., Cs, I., Groba, B., Riveiro, L. N., & Sierra, A. P. (2011). *The use of computers and augmentative and alternative communication devices by children and young with cerebral palsy*.

G3ict (2017).2016 CRPD ICT accessibility progress report: A Global Analysis of the Progress Made by States Parties to the Convention on the Rights of Persons with Disabilities to Implement its Dispositions on the Accessibility of Information and Communication Technologies and Assistive Technologies Research.Retrieved fromwww.g3ict.org

Giesbrecht, E. (2013). Application of the Human Activity Assistive Technology model for occupational therapy research. *Australian Occupational Therapy Journal*, *early view*. https://doi.org/10.1111/1440-1630.12054

Goggin, G. (2021). Disability , technology innovation and social development in China and Australia. *Journal of Asian Public Policy*, *00*(00), 1–17. https://doi.org/10.1080/17516234.2018.1492067

Guanming Shi, S. K. and A. B. (2022). The Role of Assistive Technology in Advancing Sustainable Development Goals. *Frontiers in Political Science*, *4*(May), 144–146. https://doi.org/10.3389/fpos.2022.859272

Heward, W. (2014). *Exceptional children an introduction to special education Tenth Edition*.

Huang, I. C., Sugden, D., & Beveridge, S. (2009). Assistive devices and cerebral palsy: The use

of assistive devices at school by children with cerebral palsy. *Child: Care, Health and Development*, *35*(5), 698–708. https://doi.org/10.1111/j.1365-2214.2009.00968.x

Jacobsen, D. L. (2012). *UNI ScholarWorks Assistive technology for students with disabilities : Resources and challenges encountered by teachers*.

Kabir S. (2018). Sample and Sampling. *Presentation*, *June*, 168–181.

Kamaghe, J., Luhanga, E., & Kisangiri, M. (2020). The challenges of adopting M-learning assistive technologies for visually impaired learners in higher learning institution in Tanzania. *International Journal of Emerging Technologies in Learning*, *15*(1), 140–151. https://doi.org/10.3991/ijet.v15i01.11453

Kawulich, B. (2015). *Qualitative Data Analysis Techniques*. *May*.

Kisanga, D. H., Wambura, D., &Mwalongo, F. (2018).Exploring assistive technology tools and e-learning user interface in Tanzania's vocational education institutions. International Journal of Education and Development using Information and Communication Technology (IJEDICT), 14(3), 50-71.

Kisanga, S. E. &Kisanga, D. H. (2020). The role of assistive technology devices in fostering the participation and learning of students with visual impairment in higher education institutions in Tanzania.Disability and Rehabilitation: Assistive Technology. Retrieved from https://www.tandfonline.com/doi/abs/10.1080/17483107.2020.1817989

Korn et al. (2012). *Context sensitive user centered scalability: An introduction focusing on exergames and assistive systems in work contexts*. *7516 LNCS*(May). https://doi.org/10.1007/978-3-642-33466-5

Kouroupetroglou, G. (2014). Accessibility of Documents. *Encyclopedia of Information Science and Technology, Third Edition*, *i*, 4456–4464. https://doi.org/10.4018/978-1-4666-5888-2.ch437

Lersilp, S., Putthinoi, S., & Lersilp, T. (2018). Facilitators and barriers of assistive technology and learning environment for children with special needs. *Occupational Therapy International*, *2018*. https://doi.org/10.1155/2018/3705946

Lohmann, M. J., Hovey, K. A., & Higgins, J. P. (2019). *Using Assistive Technology Tools to Support Learning in the Inclusive Preschool Classroom*. *8*(September).

Maor, D., Currie, J., & Drewry, R. (2011). The effectiveness of assistive technologies for children with special needs: A review of research-based studies. *European Journal of Special Needs Education*, *26*(3), 283–298. https://doi.org/10.1080/08856257.2011.593821

Maraizu, U. S. (2014). *An assessment of assistive technology devices and services used* (Issue January).

Mukhwana Michael. (2021). *Information and Communication Technology (ICT): Its use in Teaching students with low vision in Secondary Schools in Mkono District, UGANDA* (Issue May).

Ngonyani, J. C., & Mnyanyi, C. B. (2021). Assessing the Relevance of Assistive Technologies for Persons With Disabilities in Higher Learning Institutions: a Case of University of Dar Es Salaam in Tanzania. *European Journal of Special Education Research*, *7*(2), 52–70. https://doi.org/10.46827/ejse.v7i2.3712

Noble, H., & Heale, R. (2019). Triangulation in research, with examples. *Evidence-Based*

Nursing, *22*(3), 67–68. https://doi.org/10.1136/ebnurs-2019-103145

Onemeje, J. C. (2017). AVAILABILITY AND UTILIZATION OF ASSISTIVE TECHNOLOGIES FOR SPECIAL EDUCATION IN IBADAN METROPOLIS, OYO STATE, NIGERIA BY. In *Manajemen Asuhan Kebidanan Pada Bayi Dengan Caput Succedaneum Di Rsud Syekh Yusuf Gowa Tahun*.

Organization, W. H. (2018). *Improving access to assistive technology Report by the Director - General*. *February*, 1–6.

Pillay, N. (2014). *The Convention on the Rights of Persons with Disabilities Training Guide : Professional Training Series No.19* (Issue 19).

Pousada Garcia et a., (2011), T., Pereira Loureiro, J., Groba González, B., Nieto Riveiro, L., & Pazos Sierra, A. (2011). The use of computers and augmentative and alternative communication devices by children and young with cerebral palsy. *Assistive Technology*, *23*(3), 135–149. https://doi.org/10.1080/10400435.2011.588988

Raya, R., Rocon, E., Ceres, R., Caldern, L., & L., J. (2012). New Strategies of Mobility and Interaction for People with Cerebral Palsy. *Assistive Technologies*, *March*. https://doi.org/10.5772/31214

Robinson, O. C. (2014). *Qualitative Research in Psychology Sampling in Interview-Based Qualitative Research : A Theoretical and Practical Guide Sampling in Interview-Based Qualitative Research : A Theoretical and Practical Guide*. 37–41. https://doi.org/10.1080/14780887.2013.801543

Samwel. (2015). Influences on students' assistive technology use at school: the views of

classroom teachers, allied health professionals, students with cerebral palsy and their parents. *Disability and Rehabilitation: Assistive Technology*, *13*(8), 763–771. https://doi.org/10.1080/17483107.2017.1373307

Saturno, C. E., Ramirez, A. R. G., Conte, M. J., Farhat, M., & Piucco, E. C. (2015). An augmentative and alternative communication tool for children and adolescents with cerebral palsy. *Behaviour and Information Technology*, *34*(6), 632–645. https://doi.org/10.1080/0144929X.2015.1019567

Shikden. (2015). Teachers' Knowledge and Use of Assistive Technology for Students with Special Educational Needs. In *Journal of Studies in Education* (Vol. 3, Issue 2). https://doi.org/10.5296/jse.v3i2.3424

Sholanke, A. B., Opoko, A. P., Akpan, O. S., & Adigun, T. F. (2019). Universal Design of Selected Secondary Schools in Akwa Ibom State, Nigeria: Students' Perception of Accessibility Provisions in Meeting Their Needs. *Journal of Physics: Conference Series*, *1378*(4). https://doi.org/10.1088/1742-6596/1378/4/042087

Sigrid et al. (2015). Everyday use of assistive technology devices in school settings Everyday use of assistive technology devices in school settings. *Disability and Rehabilitation: Assistive Technology*, *00*(00), 1–6. https://doi.org/10.3109/17483107.2014.1001449

Stasolla, F., Caffò, A. O., Perilli, V., Boccasini, A., & Amico, F. D. (2018). Assistive technology for promoting adaptive skills of children with cerebral palsy : ten cases evaluation Assistive technology for promoting adaptive skills of children with cerebral palsy : ten cases evaluation. *Disability and Rehabilitation: Assistive Technology*, *0*(0), 14. https://doi.org/10.1080/17483107.2018.1467972

Toto, G. A., & Limone, P. (2021). Effectiveness and application of assisted technology in Italian special psycho-education: A pilot study. *IBIMA Business Review*, *2020*. https://doi.org/10.5171/2020.177729

Umoeshiet, E. A. (2020). *Business Educators' Level of Awareness and Utilization of Assistive Technologies in Business Education Programme in Tertiary Institutions in Delta State, Nigeria*. *2*(4).

UNESCO. (1994). the Salamanca Statement Framework. *Policy*, *June*, 7–10. https://doi.org/E D -94/WS/ 1 8

UNESCO. (2020). Inclusion and education: Global Education Monitoting Report. In *Inclusive Education Across Cultures: Crossing Boundaries, Sharing Ideas*. https://doi.org/10.4135/9788132108320.n14

URT. (2020). *Basic Education Statistics*.

URT. (2021). *THE UNITED REPUBLIC OF TANZANIA*.

Viner, M., Singh, A., & Shaughnessy, M. F. (2020). *Assistive Technology to Help Students With Disabilities* (Issue January, pp. 240–267). https://doi.org/10.4018/978-1-7998-1431-3.ch012

Violet, M. T. (2014). *Access to education and Assistive devices for children with physical disabilities in Tanzania*.

Mwantimwa, K. (2021). Exploring usage of assistive technology resources by students with disabilities. Journal of Disability Studies. 7(1), 38.47

WHO. (2016). *Improving Access To Assistive Technology for Everyone, Everywhere*. *WHO/EMP/PHI/2016.01*, 5–7.

WHO. (2018). *Improving access to assistive technology*. *May*, 5–7.

WHO. (2022). *Global report on assistive technology*.

Woodbury. (2015). *The Effects of a Training Session on Teacher Knowledge, The Effects of a Training Session on Teacher Knowledge, Perceptions, and Implementation of Assistive Technology in Perceptions, and Implementation of Assistive Technology in Secondary Schools. Second*. https://digitalcommons.usu.edu/gradreports

World Health Organization. (2018). *Improving access to assistive technology/EB142.R6*. *February*, 1–6.

Yin. (2014). *Case study research design and methods*.

Yusuf et al. (2012). *Availability of Assistive Technologies in Nigerian Educational Institutions* . *January*. 44–55.

Zupan, A., & Jenko, M. (2012). *Assistive technology for people with cerebral palsy*. *17*, 194–197.

APPENDICES

Appendix i: an interview guide for learners with cerebral palsy

I am Mwocha Janneth, a student at Kyambogo University pursuing a Master's degree in Special Education. I conducted a research study entitled "use of assistive technology by learners with cerebral palsy in secondary schools".

1. What assistive technology is available in your school? (Mobility aids, page-turners, and computer-assisted instructions among others).
2. What type of assistive technology do you want to use in your learning?
3. In which ways does assistive technology help you in learning?
4. How do you use assistive technology?
5. What hindrances do you experience in using assistive technology?
6. What are your views on the use of assistive technology in learning for learners with cerebral palsy?

THANK YOU FOR YOUR COOPERATION

Appendix ii: an interview guide for trained special needs education teacher

I am Mwocha Janneth, a student at Kyambogo University pursuing a Master's degree in Special Needs Education. I conducted a research study entitled "use of assistive technology by learners with cerebral palsy in secondary schools".

1. What assistive technology do you have in your school that enhances participation in learning for learners with cerebral palsy? (Mobility aids, page-turners, and computer-assisted instructions among others).
2. How does assistive technology enhance participation in learning for learners with cerebral palsy?
3. How do learners with cerebral palsy use assistive technology?
4. What hindrances does the school face on assistive technology to enhance participation in learning for learners with cerebral palsy?
5. What hindrances do learners with cerebral palsy face in using assistive technology?
6. What are your views on the use of assistive technology in learning for learners with cerebral palsy?

THANK YOU FOR YOUR COOPERATION

Appendix iii: An interview guide for the headteachers

I am Mwocha Janneth, a student at Kyambogo University pursuing a Master's degree in Special Needs Education. I conducted a research study entitled "use of assistive technology by learners with cerebral palsy in secondary schools".

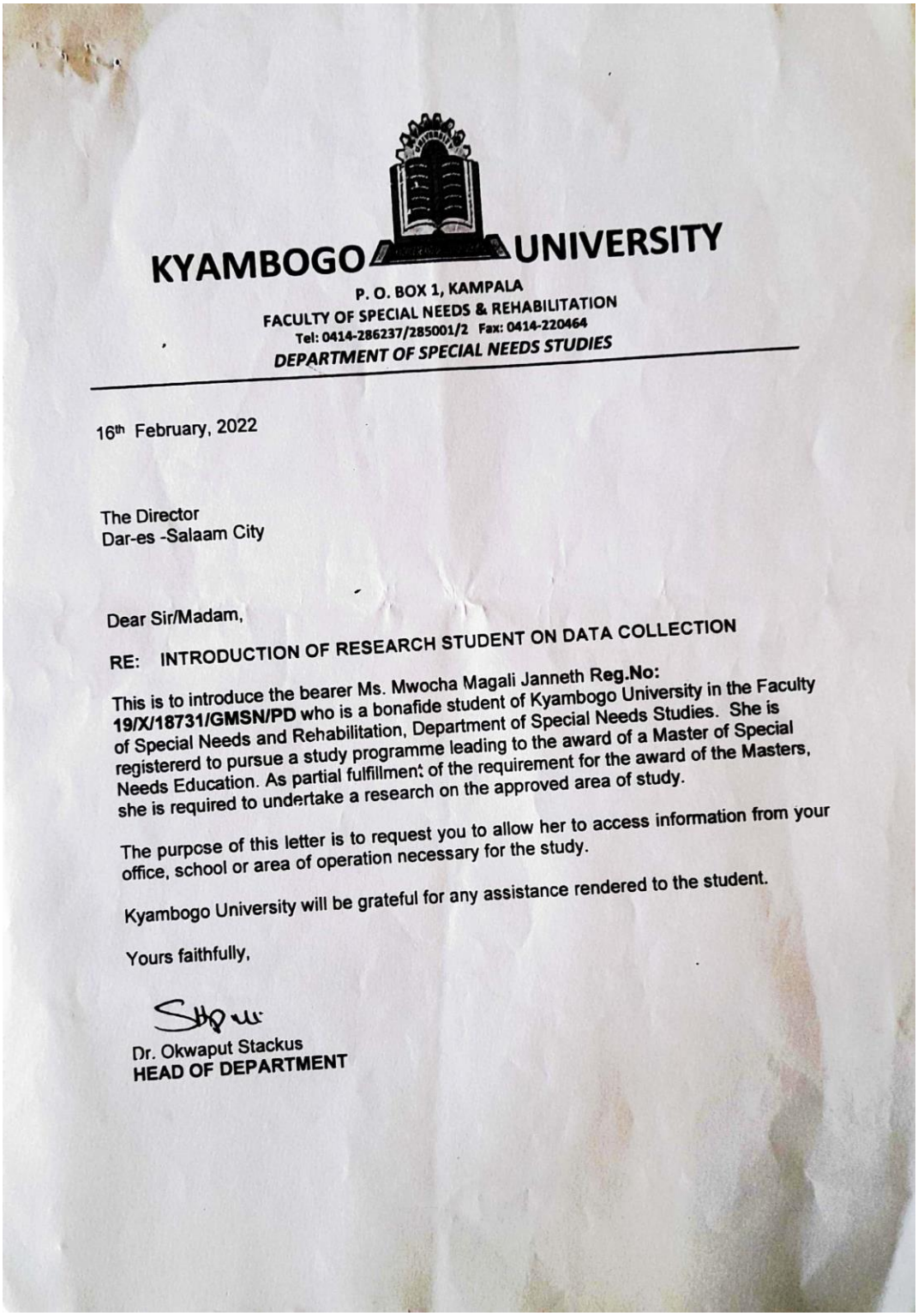
1. What assistive technology do you have in your school which enhances participation in learning for learners with cerebral palsy? (Mobility aids, page-turners, and computer-assisted instructions among others).
2. How does assistive technology enhance participation in learning for learners with cerebral palsy?
3. How do learners with cerebral palsy use assistive technology?
4. What hindrances does the school face in the use of assistive technology to enhance participation in learning for learners with cerebral palsy?
5. What hindrances do learners with cerebral palsy face in using assistive technology?
6. What are your views on the use of assistive technology in learning for learners with cerebral palsy?

THANK YOU FOR YOUR COOPERATION

Appendix iv: Observation guide

Aspect to observe	Item expected	Available	Comment
Room	- Assistive Technology resources room		
Low-tech	• -Page-turners		
	• -Pencil grips		
	• -Pen grips		
	• -Manual signs		
	• -Adapted desks		
	• -Audio recorders		
	• -Audio notes		
	• -Reading stand		
	• -Writing stand		
	• -Head pointers		
	• -Walking frame		
	• -Manual wheelchair		
	• -Manual communication board		
	• Recorded learners and teacher contributions of the lesson		
High-tech	• -Adapted computers		
	• -Adapted keyboard		
	• -Adapted mouse		
	• Electronic communication board		
	• -Printers		
	• -Projectors		
	• -Internet for accessing materials		
	• -Digital books/notes		
	• -Electronic wheelchairs		
	• -Washing machines		

Appendix v: Introductory letter



KYAMBOGO UNIVERSITY

P. O. BOX 1, KAMPALA
FACULTY OF SPECIAL NEEDS & REHABILITATION
Tel: 0414-286237/285001/2 Fax: 0414-220464
DEPARTMENT OF SPECIAL NEEDS STUDIES

16th February, 2022

The Director
Dar-es -Salaam City

Dear Sir/Madam,

RE: INTRODUCTION OF RESEARCH STUDENT ON DATA COLLECTION

This is to introduce the bearer Ms. Mwocha Magali Janneth **Reg.No: 19/X/18731/GMSN/PD** who is a bonafide student of Kyambogo University in the Faculty of Special Needs and Rehabilitation, Department of Special Needs Studies. She is registererd to pursue a study programme leading to the award of a Master of Special Needs Education. As partial fulfillment of the requirement for the award of the Masters, she is required to undertake a research on the approved area of study.

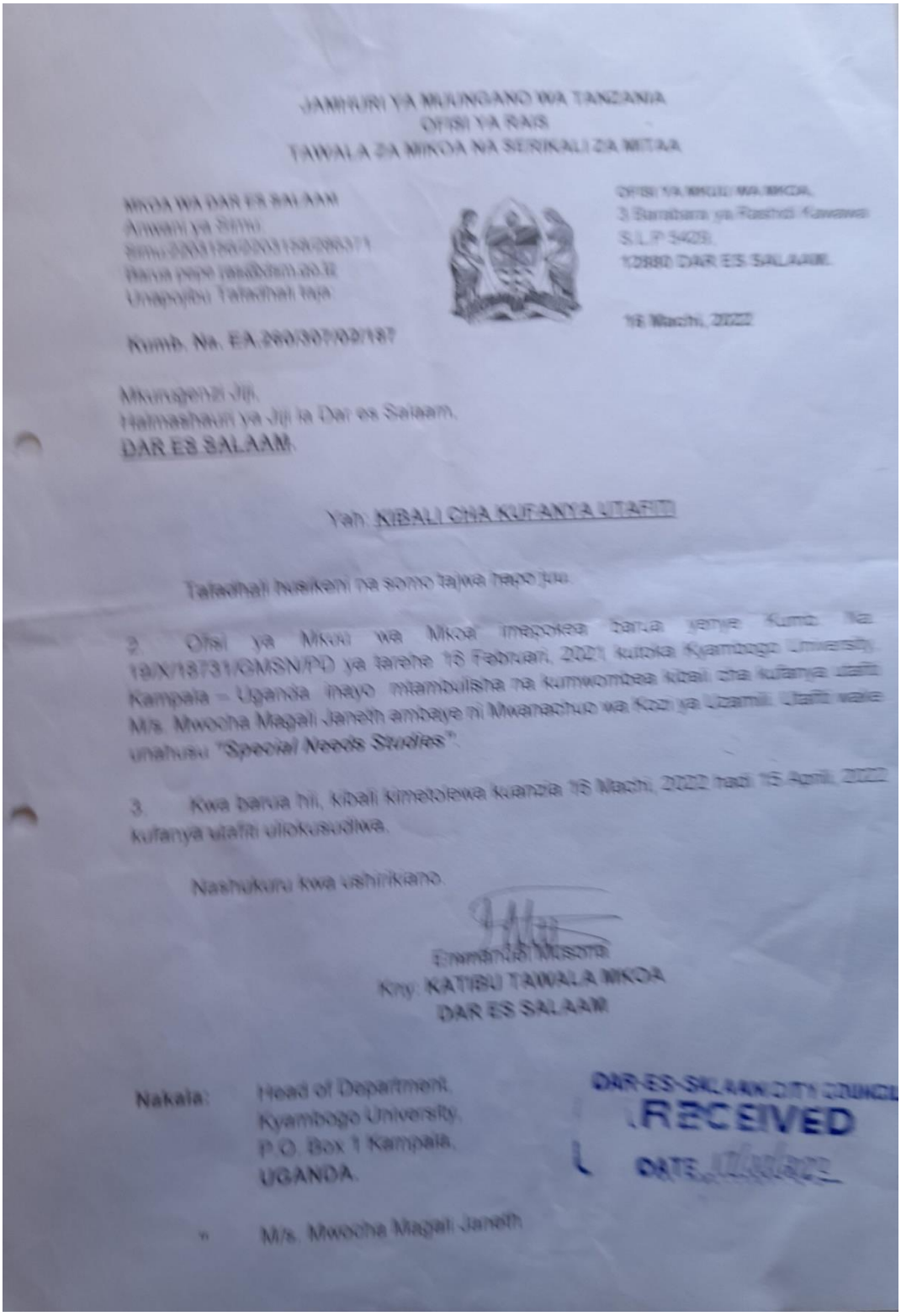
The purpose of this letter is to request you to allow her to access information from your office, school or area of operation necessary for the study.

Kyambogo University will be grateful for any assistance rendered to the student.

Yours faithfully,

Dr. Okwaput Stackus
HEAD OF DEPARTMENT

Appendix vi: Permission letter



JAMHURI YA MUUNGANO WA TANZANIA
OFISI YA RAIS
TAWALA ZA MIKOA NA SERIKALI ZA MITAA

MKOA WA DAR ES SALAAM
Anwani ya Simu:
Simu:[illegible]
Barua pepe:ras@dsm.go.tz
Unapojibu Tafadhali taja

OFISI YA MKUU WA MKOA,
3 Barabara ya Rashid Kawawa
S.L.P 5429,
12880 DAR ES SALAAM.

Kumb. Na. EA.280/307/02/187

16 Machi, 2022

Mkurugenzi Jiji,
Halmashauri ya Jiji la Dar es Salaam,
DAR ES SALAAM.

Yah: KIBALI CHA KUFANYA UTAFITI

Tafadhali husikani na somo tajwa hapo juu.

2. Ofisi ya Mkuu wa Mkoa imepokea barua yenye Kumb. Na. 19/X/18731/GMSN/PD ya tarehe 16 Februari, 2021 kutoka Kyambogo University, Kampala – Uganda inayo nitambulisha na kuniomba kibali cha kufanya utafiti M/s. Mwocha Magali Janeth ambaye ni Mwanachuo wa Kozi ya Uzamili, Utafiti wake unahusu *"Special Needs Studies"*.

3. Kwa barua hii, kibali kimetolewa kuanzia 16 Machi, 2022 hadi 15 April, 2022 kufanya utafiti uliokusudiwa.

Nashukuru kwa ushirikiano.

Emmanuel Masonga
Kny: KATIBU TAWALA MKOA
DAR ES SALAAM

Nakala: Head of Department,
Kyambogo University,
P.O. Box 1 Kampala,
UGANDA.

DAR-ES-SALAAM CITY COUNCIL
RECEIVED
DATE

- M/s. Mwocha Magali Janeth

Appendix vii: Consent form

Kyambogo University

Faculty of special needs and Rehabilitation

Department of special needs

CONSENT FORM

Dear participant

I am a student of Kyambogo University pursuing a master's degree in Special Needs Education. I am carrying out a research study on the "use of assistive technology for learningby learners with cerebral palsy in secondary schools" It is hoped that the findings of the study will help to inform educators on how assistive technologies are useful in learning to learners with cerebral palsy in secondary schools and provide information to the government through the ministries which dealing with education as well as other stakeholders for policy formulation, planning, developing and providing appropriate assistive technology materials for learners with cerebral palsy in secondary schools in the country.

You have been identified as one of the participants who can inform the study through an interview. The interview will focus on the availability of assistive technology for learning, enhancement of assistive technology to learners with cerebral palsy, the use of assistive technology in learning and the hindrance in using assistive technology. The interview is probably to last 20-45 minutes. The purpose of this letter is to request you to participate in the study. Whether the information you will provide will be used for the purpose of the study and academics only and will be kept confidential. You will also be free to withdraw from the study in case you feel uncomfortable to proceed with the participation.

Thank you very much for your support and co-operative in advance.
Yours sincerely

Mwocha Magali Janneth

Confirmation of acceptance

I have read and understood the purpose of the study and I hereby consent toparticipate.

Signature……..Date…….

Appendix viii: Consent form in Kiswahili

FOMU YA RIDHAA

Mpendwa mshiriki,

Mimi ni mwanafunzi ninaesoma shahada ya Uzamili ya Elimu Maalum katika chuo kikuu cha Kyambogo. Ninafanya utafiti kuhusu "matumizi ya teknolojia saidizi kwa wanafunzi wenye mtindio wa ubongo (cerebral palsy) wanaosoma katika shule za sekondari".

Ni matumaini yangu kuwa matokeo ya utafiti huu yatasaidia kuelimisha kuhusu umuhimu wa teknolojia saidizi katika ujifunzaji wa wanafunzi wenye mtindio wa ubongo wanaosoma katika shule za sekondari, kuitaarifu serikali kupitia wizara zinazoshughulikia elimu pamoja na wadau wote wa elimu. Matokeo ya utafiti yatasaidia kwenye kutunga sheria na miongozo, kupanga mipango mbalimbali pamoja na kuwezesha upatikanaji wa teknolojia saidizi kulingana na uhitaji wa wanafunzi wenye mtindio wa ubongo wanaosoma katika shule za sekondari nchini.

Umechaguliwa kuwa mmoja wa washiriki wanaoweza kufanikisha utafiti huu kupitia mahojiano ambayo yatahusu uwepo wa teknolojia saidizi kwa ajili ya ujifunzaji, matumizi ya teknolojia saidizi pamoja na kikwazo vinavyowakabili wanafunzi katika kutumia teknolojia saidizi. Mahojiano yatakuwa kati ya dakika 20-45.

Dhumuni la barua hii ni kuomba ushiriki wako katika kutoa taarifa zitakazofanikisha utafiti huu. Taarifa utakazotoa zitatumika kwa madhumuni ya utafiti wa kitaaluma tu na zitatunzwa kwa siri. Pia utakuwa huru kujitoa katika mahojiano endapo hutaridhika kuendelea na ushiriki.

Nakushukuru sana kwa ushirikiano

Wako katika kufanikisha elimu

Janneth Magali Mwocha

Uthibitisho wa kukubali

Nimesoma na kuelewa dhumuni la utafiti na hivyo ninakubali kushiriki.

Sahihi……..Tarehe……..

Appendix ix: Map of the area of the study

MAP OF DAR-ES-SALAAM CITY