OPEN ACCESS

Journal of Advances in Education and Philosophy
Abbreviated Key Title: J Adv Educ Philos
ISSN 2523-2665 (Print) | ISSN 2523-2223 (Online)
Scholars Middle East Publishers, Dubai, United Arab Emirates
Journal homepage: https://saudijournals.com

Original Research Article

Exploring The Impact of Assistive Technology on Academic Achievement for Visually Impaired Students in Zanzibar's Primary Schools

Ali Issa Suleiman[1*], Abdalla Abu Shaame (PhD)[1], Said Khamis Juma (PhD)[1]

[1]The State University of Zanzibar, Zanzibar, Tanzania

DOI: https://doi.org/10.36348/jaep.2024.v08i11.006 | **Received:** 03.09.2024 | **Accepted:** 10.10.2024 | **Published:** 27.11.2024

***Corresponding author:** Ali Issa Suleiman
The State University of Zanzibar, Zanzibar, Tanzania

Abstract

Assistive technology is utilized in Zanzibar primary schools and Tanzania at large. However, there is a shortage of information on its impacts on enhancing academic achievement due to the scarcity of studies conducted in this area. Therefore this study's main purpose was to explore the assistive technology's impacts on enhancing academic achievement for students with visual impairments in Zanzibar primary schools. In addition, the study sought to examine barriers that students with visual impairment face while utilizing assistive technology during the teaching and learning process. The study utilized a qualitative approach, with 28 participants using interviews, focus group discussions, and observations for data collection. The data was transcribed, coded, categorized and then analyzed using the thematic analysis method. The findings of this study indicated that assistive technology has a great impact on enhancing academic achievement for students with visual impairments hence it improves the learning capability of learners. The findings also revealed several barriers faced by students during the utilization of assistive technology including limited teaching and learning resources especially those written in Braille and overcrowded classes. Based on these findings, the study recommended that the Ministry of Education and Vocational Training collaborate with educational stakeholders such as NGOs, teachers and parents to enhance efforts in providing adequate and relevant assistive devices and teaching and learning materials for both teachers and students with visual impairments.

Keywords: Assistive technology, visual impairments, academic achievement, primary school students, Zanzibar.

1. INTRODUCTION

People with disabilities have long been neglected and denied education particularly those with visual impairments (Bornman, 2020). In the past, they were often cast aside or even subjected to violence due to the belief that they were cursed by God (Safford & Safford, 1996). In Tanzania and Zanzibar as a part, children with disabilities particularly those with visual impairments were hidden away or even killed (UNICEF, 2021; Wilson, 2016). However, in Europe, the recognition of their humanity began to emerge in the 19th century when a Frenchman "Itard" started teaching a deaf child "The Wild Boy" (Lane, 1976). Since then, the world started to provide education to this group of children as they seemed teachable and learnable using assistive technology (Sze, 2019).

In Tanzania Mainland, the process of educating children with visual impairments started in 1950, spearheaded by the Church Missionary Society. Prior to this, no established schools catering to individuals with special needs in either Tanganyika or Zanzibar. The first school dedicated to students with visual disabilities was established at Buigiri in Dodoma by the Church Missionary Society in 1950. The organization not only trained teachers but also sought international support for teaching and learning resources. This institution provided boarding facilities for students with visual impairments, who were rarely integrated with their peers without disabilities. In 1951, the Pentecostal Church further contributed to this cause by founding the Furaha Primary School in Tabora (Possi & Milinga, 2017).

In Zanzibar, the movement towards educating children with disabilities began in July 1964, shortly after the political revolution of the Arab sultanate. Following the nationalization of all schools, education was recognized as a fundamental right for all Zanzibaris. This was reinforced by the government's declaration of free education for all on September 23, 1964, including

both pre-primary and primary education, irrespective of race, differences and gender (Hemed, 2019; Juma, 2018; Juma & Mussa, 2024).

For many years, Zanzibar officially lacked public specialized schools for children with disabilities at any educational level before 2005. Nevertheless, during the 1990s, the Zanzibar Ministry of Education established nine special education units catering to children with disabilities, comprising seven units for intellectual disabilities, one for hearing impairments, and one for visual impairments. These units were integrated into several regular primary schools, allowing children with disabilities to learn alongside their non-disabled peers. In 2022, the Zanzibar government initiated the construction of two boarding schools, which currently accommodate students with hearing and visual impairments. These schools are also intended to enrol other students without disabilities from the surrounding areas (Juma, 2018; Juma & Mussa, 2024).

Nevertheless, despite these advancements, children with disabilities especially those with visual impairments still face barriers to education (Bornman, 2020). The integration of children with disabilities into mainstream educational environments is largely hindered by numerous prevailing social and cultural beliefs that they are incapable of learning (MoEVT, 2006). Parents are of the view that students with disabilities can learn nothing as they believe that nothing can be done to make their children with disabilities learn (Juma & Mussa, 2024). A prominent concern is the perception among some parents and teachers that including a child with disabilities could disrupt the efficient functioning of classrooms. Furthermore, there is apprehension regarding the inadequacy of resources and modifications within schools and classrooms to meet the specific mobility and equipment requirements of these children (MoEVT, 2006).

In response to these circumstances, both Tanzanian governments, along with educational collaborators, have implemented several efforts to guarantee universal access to education for all children, irrespective of their physical or mental capabilities. Aligned with the principles outlined in the Salamanca Statement and Framework for Action, as well as the Sustainable Development Goals (SDG) that strive to ensure inclusivity, the Tanzanian governments have adopted several policies such as the Persons with Disabilities Act 2010 and the National Strategy for Inclusive Education 2021/22-25/2026 in Tanzania mainland and the Zanzibar Disability Development Policy of 2004 and the Zanzibar Vision 2020 in Zanzibar. These measures aimed to enhance the educational landscape by augmenting available resources and providing necessary equipment to students with disabilities (MoEVT, 2006).

At present, within the primary schools in Tanzania and Zanzibar in particular, there exists a variety of assistive tools employed by teachers and students with visual impairments to facilitate their teaching and learning processes. These include the Pan Kin Braille, Obit Reader Twenty, A4 Frame, Voice Recorders, embosser and computers (Juma & Ntulo, 2024). However, limited information exists on the impact of assistive technology on enhancing academic achievement for this group of learners in the Zanzibar context since there is a scarcity of studies conducted in this field. For this reason, therefore, the study aimed to deliberately explore the impact of assistive technology on enhancing academic achievement for students with visual impairments in Zanzibar primary schools.

RESEARCH QUESTIONS

This study attempted to answer the following two main questions (1) How does assistive technology impact academic achievement for students with visual impairment in Zanzibar primary schools? (2) How do students with visual impairment face barriers while using assistive technology in Zanzibar primary schools?

2. LITERATURE REVIEW

2.1 The Availability and Accessibility of Assistive Technology

According to WHO & UNICEF (2022) "assistive technologies" refers to a diverse range of technologies, equipment, devices, apparatus, services, systems, processes, and environmental changes that enable people with disabilities particularly those with visual impairments to actively participate in society and overcome physical, social, and infrastructural barriers. At present, there is a variety of assistive technologies in primary schools utilized by both teachers and students in the teaching and learning process as reviewed in several studies.

Ngundo and Muriithi (2023) conducted a study that examined the perceived impact of Assistive Technology Devices (ATDs) on the academic performance of students with low vision in the Ruchu and Ithiru wards of Kandara constituency, Kenya. The primary objective of the study was to evaluate the availability and effectiveness of ATDs in enhancing the educational outcomes of learners with low vision. Utilizing a mixed-methods approach, the study employed both purposive and systematic random sampling techniques to select participants. Data collection was carried out through structured questionnaires and interviews. The findings indicated a variety of available ATDs, including Braille materials, large print resources, and magnifiers; however, there was a notable lack of advanced high-tech AT devices, such as digitally recorded communication tools, alternative adapted mice, and specialized keyboards. Additionally, the study identified financial barriers to acquiring specialized ATDs, resulting in resource-sharing among students. The study further revealed that the limited

availability of high-tech assistive technologies and insufficient ATDs had a considerable negative impact on the academic performance of learners with low vision. The study recommended increased funding for advanced AT devices, enhanced resource allocation and accessibility, regular evaluations and upgrades of existing resources, and professional development opportunities for teachers to effectively incorporate assistive technologies into the classroom.

Adeke (2019) carried out a study examining the impact of educational technology on reading learning for students with visual impairments in inclusive primary schools located in Kumi Municipality, Kumi District, Uganda. The study aimed to identify the specific types of educational technology employed by teachers in this context, assess the relevance of such technology, and explore the challenges faced by teachers when integrating educational technology into their teaching practices. A qualitative case study design was utilized for this investigation, incorporating semi-structured interviews and focus group discussions as primary data collection methods. The results revealed that the educational technologies utilized by teachers included Braille materials, audio recorders, and magnifying lenses. The study concluded that teachers effectively employ various forms of educational technology that are pertinent in teaching reading to learners with visual impairments.

Akiyoo, Mosha & Ogoti (2022) conducted a qualitative study assessing the adequacy of teaching and learning resources for the implementation of inclusive education in public primary schools in the Arusha region Tanzania. The study employed a mixed-methods approach, utilizing a convergent research design. To gather the study sample, both probability and non-probability sampling methods were applied. Data collection was facilitated through the use of questionnaires and interview guides. The quantitative data were subjected to descriptive statistical analysis, while the qualitative data were analyzed thematically and presented in a narrative format. The results indicated a significant lack of adequate teaching and learning resources essential for the successful implementation of inclusive education. Specifically, the availability of computers, wheelchairs, assistive technologies, and Braille machines was found to be insufficient. The study concluded that the successful implementation of inclusive education is contingent upon the availability of appropriate teaching and learning resources. Consequently, it was recommended that the government and educational stakeholders take measures to ensure the provision of sufficient teaching and learning resources in all schools that offer inclusive education.

Bahati (2023) conducted a qualitative case study examining the use of ATs in teaching and learning of LwVI in primary schools in Kasulu District, Tanzania. Data collection was carried out through observations and interviews. The findings indicate that while primary schools possess some ATs, a significant number are either unavailable or inadequate to meet the needs of LwVI students. Additionally, the schools face challenges due to a limited selection of low-tech ATs and a scarcity of high-tech options, with some existing ATs rendered inoperable due to malfunctions and a lack of maintenance. The study also highlights that the effective use of ATs is further obstructed by inadequate infrastructure. Consequently, the study concludes that the availability of ATs in these schools is minimal, and their utilization is significantly restricted by various challenges. The study ultimately recommends that stakeholders, including the Ministry of Education, Science and Technology (MoEST) and non-governmental organizations (NGOs), collaborate to provide primary schools with necessary ATs and establish the required supportive infrastructure. Furthermore, it advocates for appropriate budget allocations to facilitate the acquisition of ATs for primary schools in Tanzania, which is essential for improving educational outcomes for LwVI students.

Gronlund, Lim & Larsson (2010) conducted a qualitative case study focusing on the effective utilization of assistive technologies in promoting inclusive education in developing nations, specifically in Bangladesh and Tanzania and Zanzibar as a part. The study adopted the literature review, interviews and observation as data collection methods. The study revealed that in mainstream schools in developing countries, assistive technology is largely absent due to two significant factors. Firstly, the education of children with disabilities in these countries is a contentious issue, thus the primary focus lies on identifying and ensuring their access to education. Secondly, technology in general is seldom utilized within schools, involving not only ICT-ATs but also physical aids like glasses. The prevalent AT solutions employed are low-tech and cost-effective alternatives such as slates, pens, paper for manual writing, canes, wheelchairs, and similar aids.

2.2 Barriers to Using Assistive Technology

Students with visual impairments encounter significant obstacles especially when utilizing assistive technology during the teaching and learning process. This matter was explored in Shanker and Kant's (2021) qualitative study on assistive technologies for individuals with visual impairments, which focused on the barriers to inclusion. The study employed semi-structured interviews for data collection. The study revealed that the absence of specific guidelines for the utilization of assistive technology stands as the primary barrier. Shanker and Kant's (2021) study further highlighted that inadequate resources and a lack of user proficiency hinder the effective utilization of assistive technology.

Morelle (2016) conducted a qualitative study focusing on the challenges faced by students with visual

impairment in mainstream primary schools. The study used interviews and observation as the data collection methods. The findings of the study revealed that despite being physically integrated into the mainstream classes, these learners are not fully included and consequently face numerous difficulties. Insufficient support and training for teachers, as well as limited involvement of parents in their children's education, were identified as contributing factors. Furthermore, the teaching methods and materials were found to be inadequately adapted for students with visual impairment, and the physical environment within the classrooms and school grounds was not fully accessible to them. The study also highlighted a lack of resources and a negative attitude among teachers.

Gronlund, Lim, and Larsson (2010) conducted a qualitative case study design using interviews and observation as data collection methods. The study focused on the effective utilization of assistive technologies in promoting inclusive education in developing nations, specifically in Tanzania and Bangladesh. The study revealed that teachers generally lack the necessary skills to effectively educate children with disabilities and use assistive technology tools. Moreover, the study highlighted that the integration of assistive technologies into inclusive education is often perceived as an unrealistic goal in developing countries due to limited resources.

In a study conducted by Wilson (2016), the focus was on the difficulties encountered by children with visual impairment when it comes to accessing inclusive primary education. The study utilized both primary and secondary data collection methods. Interviews and observation were employed for primary data and documentary review technique was used for collecting secondary data. The findings revealed that the learning environment at the school was not conducive for learners with visual impairment due to inadequate infrastructure. Additionally, the study documented a shortage of learning and teaching resources, and teachers lacked the necessary skills to effectively support these students. Discrimination also emerged as a significant issue, with students with visual impairment tending to associate primarily with their visual impairment peers.

Similarly, Kiomoka (2014) conducted a qualitative case study design, focusing on children with visual impairments. The study employed semi-structured interviews and non-participatory observation as data collection methods. The study aimed to explore the challenges faced by these children in terms of learning and participating in inclusive primary schools. The study revealed that there was a lack of adequate teaching and learning resources, which hindered the educational progress of students with visual impairment. Additionally, there was a shortage of teachers specifically trained to support students with visual impairment. Moreover, the physical environments of the schools were not conducive to the needs of students with visual impairment. Furthermore, the study highlighted poor cooperation between teachers themselves and parents, which further hindered the educational experience of children with visual impairment. Additionally, the findings indicated a high prevalence of stigmatization among learners with visual impairments, which negatively impacted their self-esteem and overall educational outcomes.

Despite the cited literature, there is still a need to investigate further on the impact of assistive technologies for students with visual impairments.

3. THEORETICAL FRAMEWORK

3.1 Capability Theory

The study is based on Capability theory, a framework developed by Amartya Sen and Martha Nussbaum in the 1980s. This theory draws inspiration from both Aristotelian and Marxist ideas of human flourishing and the pursuit of a good life (Sen & Nussbaum, 1993). At its core, the theory revolves around two fundamental concepts: ability and function. Sen and Nussbaum argue that "functions" include both states of being and actions, while "capability" refers to what individuals can do and be (Sen & Nussbaum, 1993). Capabilities, therefore, refer to the essential functions that individuals need to have, allowing them the genuine freedom to select from a range of functions and combinations (Terzi, 2005); Reindal, 2010). Furthermore, Sen and Nussbaum (1993) emphasize that people's functioning is heavily influenced by the equitable distribution of resources within a given society. They posit that the unequal distribution of resources is the primary cause of the impairment of individuals' abilities and functions. Consequently, according to them, a person's disability can be attributed to the unequal allocation of resources in the society they inhabit. They further insist that, for individuals to lead a good life and fully utilize their abilities, it is crucial to strengthen the environment, in which they reside (Terzi, 2005).

Hence, the capability approach serves as a theoretical framework that emphasizes the significance of individuals' capabilities and their potential for expansion to enhance their overall well-being. In the context of this study, the theory proves valuable as it specifically focuses on the utilization of assistive technology by students with visual impairment. By adopting this approach, the effectiveness of assistive technology in terms of augmenting the capabilities of students with visual impairment can be evaluated.

The capability theory emphasizes the importance of equipping students with disabilities with the necessary tools and resources to support their success in school. It specifically highlights the utilization of assistive technology to allow students with visual impairment to access identical information as their classmates and engage in classroom activities. The

capability approach improves the use of assistive technology among students with visual impairment in multiple ways. Firstly, it identifies the specific capabilities that are crucial for students with visual impairment and demonstrates how assistive technology can be employed to enhance these capabilities (Fernández-Batanero *et al*., 2022). This ensures that the technology is tailored to meet the unique needs of students with visual impairments. Secondly, the capability approach aids in evaluating the effectiveness of assistive technology in terms of how it enhances the capabilities of students with visual impairment. By assessing the impact of the technology on their abilities, teachers and practitioners can determine its efficacy and make informed decisions regarding its implementation.

The theory also assists in evaluating the overall well-being of students with visual impairment through the use of assistive technology. It recognizes that the impact of these devices extends beyond academic performance and considers their influence on the student's overall quality of life. Furthermore, the theory emphasizes that the distribution and utilization of assistive technology should be accompanied by skill training on how to effectively use these devices. It is important to assess the functional limitations of individual users and provide them with appropriate technological devices that suit their specific needs. Additionally, the theory underscores the importance of creating a conducive teaching and learning environment that supports the use of assistive devices. This includes ensuring that classrooms are equipped with the necessary infrastructure and resources to facilitate the effective use of assistive technology (Terzi, 2005); Reindal, 2010).

In conclusion, the capability theory highlights the significance of providing students with visual impairment with assistive technology to enhance their capabilities and overall well-being. It emphasizes the need for tailored technology, skill training, and a supportive learning environment to maximize the benefits of assistive devices for these students.

4. RESEARCH METHODOLOGY

4.1 The Study Area

The study was conducted in an urban district, one of the eleven Zanzibar districts. This decision was made considering the availability of personnel and material resources. The specific primary school that was the focus of the study was Primary School X and The Inclusive Education and Life Skills Unit under the Ministry of Education and Vocational Training. The selection of these areas was based on two primary factors. Firstly, among the nine primary schools with inclusive class units, Primary School X stands out as the sole school in the country that accommodates students with visual impairment, and Inclusive Education and Life Skills Units serve as the government's active agent dealing with disability problems. Secondly, Primary School X recently was equipped with assistive devices. Notably, this school is the only place where assistive technology is extensively employed compared to other schools and has a significant number of teachers dealing with students with visual impairments.

4.2 Research Design

The study employed a cross-sectional study which used qualitative approaches. This choice was based on the fact that the study focused on a group of around 37 students with visual impairments. Out of these students, twenty were in grade two or higher and had started using assistive tools such as A4 Frame, Braille Machine, voice recorder and Orbit Reader 20.

4.3 Data Collection Methods

The study employed semi-structured interviews, Focus Group Discussions and non-participatory observation techniques for data collection. In-depth interviews (IDIs) were used for teachers and an inclusive educational officer while focus group discussions and observation were employed for both teachers and students with visual impairments. The Focus Group Discussions (FGDs) comprised homogeneous groups comprising males and females separately. Depth Interviews and Focus Group Discussions were done in convenient places of the participants' choice with both auditory and visual privacy. Depth Interviews lasted from 15 to 25 minutes while FGDs took 45 to 90 minutes. Both IDIs and FGDs were recorded using a digital recorder. Interview sessions were conducted by a team consisting of two members; one served as a primary interviewer and the other as a note-taker. After each session, the interviewer and note-taker convened to review and align their notes, ensuring accuracy and consistency in the data collected.

4.4 Study Population and Sampling

Due to the case study design, participants were purposively and conveniently selected. The study recruited a total of 28 participants. These participants included 20 students with visual impairments, 6 teachers, among them three with visual impairments, a headmistress and an inclusive educational officer.

4.5 Data Analysis

After the completion of data collection, the data was then transcribed verbatim, coded and analyzed using the inductive thematic data analysis method as summarized in Table 1. Anonymous numbered abbreviations were used for participants during data analysis for identification purposes. Abbreviation SVI for a student with visual impairment, PST for professional sighted teacher, TVI for teacher with visual impairment, HM for headmistress and IEO for inclusive education officer. The second-grade students were included in the study because the school examined has two provisions. The first is an inclusive unit that accepts students from kindergarten to grade two, where the majority of students with visual impairment are enrolled. The second type is the mainstream inclusive classes,

which include both students with visual impairment and sighted students from grades three to seven. The teachers' years of experience in teaching students with visual impairments were also recorded. The profile of the participants has been summarized in Tables 2a and b below.

Table 1: Primary themes and sub-themes

Primary themes	Sub-themes
Positive impact of assistive technology on students with visual impairments.	-Improvement of academic achievement.
Barriers that face students with visual impairment in utilizing assistive technology.	-Limited assistive devices, teaching and learning materials. -Malfunctions of the devices. -Overcrowded classes. -Limited skilled teachers. -Limited technical skills in assistive devices. -Absence of efficient transport systems.

Table 2a: Students with visual impairments

Age (Years)		Grade	Number
Age	Number		
7	1	2	15
8	5	3	1
9	8	6	2
10	1	7	2
11	1		
13	1		
16	2		
19	1		
Total	20		20

Table 2b: Teachers and an Inclusive Officer

Participant type	Level of education	Year of experience
PST-1	Diploma	1 year and 6 months
PST-2	Diploma	14 years
PST-3	Diploma	1 year and 6 months
TVI -4	Diploma	1 year and 6 months
TVI -5	Diploma	13 years
TVI -6	Diploma	16 years
HM	Bachelor Degree	35years
IEO	Master degree	18 years

5. THE FINDINGS OF THE STUDY

This section provides an overview of the findings of the study, with a focus on the primary and sub-themes as outlined in Table 1.

5.1 Positive impact of assistive technology on students with visual impairments.

The first objective of this study was to examine the impact of assistive technology on enhancing academic achievement for students with visual impairments in Zanzibar primary schools. To address this study inquiry, information was gathered via interviews and observations as described below.

5.1.1 Improvement of Academic Achievement

The study investigated the availability and accessibility of assistive devices teachers and students with visual impairment utilize during their teaching and learning. The study found that the majority of the participants have access to some assistive devices during their teaching and learning process as one of the students claimed that:

> "We use Braille machine while in school when we are writing notes and A4 Frame while doing our homework at home" SVI- 20 G6).

In this phenomenon, teachers also claimed the same situation as one said:

> "Students use Braille machine here in school while writing their notes" (PST-2).

The study conducted an observation to confirm the availability of the mentioned devices. During the observation, the study noted the presence of the tools during the study where some students who are visually impaired use a Braille machine in their classes and some tools were found in a school store. They specifically mentioned some of the assistive devices they possess which include Braille Machines, A4 Frames, Voice

Recorders, Computers, Magnifying glasses, Embosser, Figures, and Orbit Reader 20, as depicted in Table 3 below.

Table 3: A profile of the assistive devices available in the study area

SN	ITEMS	AMOUNT
1	Perkins Braille	25
2	Orbit Reader 20	14
3	A 4 Frame	10
4	Figures	20
5	Magnifying glasses	15
6	Voice Recorder	8
7	Computer	3
8	Embosser	1

The study wanted to know the extent to which assistive technology contributes to the academic success of students with visual impairments. The participants expressed strong agreement with this inquiry, as one student remarked that:

> "Assistive technology significantly enhances our learning experience, enabling us to independently write and read notes, an ability that was challenging for us when we did not use assistive devices properly" (SVI16).

Students can do the examination without relying on support from another person. One student added that:

> "Since we were able to use these devices we can write and read notes and do examination papers by ourselves without depending much on the assistance from others. This increased our confidence and good academic performance. We are now competing with the sighted students" (SVI 18).

Teachers were of the same view that assistive technology improves students academically. During the interview, the teacher claimed:

> "Frankly speaking assistive technology has a great impact in enhancing students with visual impairment academically. As you know, it is difficult for these students to teach and learn in success without the use of assistive devices. At first, these students could not do well academically. However, when they got used to the use of assistive devices such as Braille machines and A4 Frame, their academic performance became higher. Thus, assistive technology has 90 per cent to academic achievement contributions to these learners" (PST2).

When the study asked if there was a difference in academic achievement between students who can use assistive devices and those who cannot. The participants stated that there is a great difference between those who are proficient in A 4 frame and Braille machines as one explained:

> "Students who use assistive devices such as Braille and A4 Frame perform better academically since they can write and read by themselves while those who do not use these devices have to be written or read notes by others since they use much strength in cramming which took a long time to understand"(PST2).

When the study wanted to know why they don't use modern oral technological devices such as talking or sound devices like sound Braille and computers, they became astonished and provoked that, they did not hear or see such kind of devices as one of the participants reported:

> "Mhh! I don't know if there are sound devices" (TVI-4).

When the study asked which they would prefer to use in their teaching and learning either the analogue devices or advanced talking machines, with excitement, almost all participants preferred the advanced digital machines and wished one day to have and use them in their teaching and learning process.

The findings of the study indicated that assistive technology plays a great role in enhancing the academic achievement of students with visual impairment. This fact was realized when the participants stated that it is difficult to teach students with visual impairment and learn successfully without assistive technology.

Teachers were of the view that assistive technology is integral to the academic experiences and overall lives of these students. This technology enhances their learning capabilities by fostering independent learning. According to the study's findings, assistive technology boosts the confidence of students with visual impairments, enabling them to read and write independently, which in turn improves their academic performance. Based on their responses, students with visual impairments noted that assistive technology has made previously perceived impossible tasks achievable. They indicated that before utilizing assistive devices like A4 Frames and Braille machines; they struggled with reading and writing. Now, these tools allow them to independently manage their notes and examination papers without excessive reliance on sighted peers. This progress has empowered them to compete on equal footing with sighted students. The findings of this study are consistent with those of Sze (2019), which reported that assistive technology facilitates independent and confident learning for students with visual impairments, emphasizing that the absence of such devices complicates the teaching and learning process for this group of learners as a result, hindering their academic performance.

The findings showed participants' preference for modern technological tools upon realizing the availability of more advanced and digital assistive tools for teaching and learning to students with visual impairments. This realization occurred during a discussion with a study which inquired about their reluctance to use new tools like talking machines. The responses indicated that both teachers and students not only lack access to modern tools but also lack information about the latest developments in teaching and supporting them. They expressed excitement and a desire to have and utilize oral/talking machines in the future.

5.2. Barriers that Face Students with Visual Impairment in Utilizing Assistive Technology in the Teaching and Learning Process

The second objective of this study was to identify the barriers that students with visual impairments face when utilizing assistive technology in Zanzibar primary schools. The data were collected through interviews, observation and focus group discussion as illustrated below.

5.2.1 Limited Assistive Devices, Teaching and Learning Materials

The study wanted to know the barriers facing students with visual impairment when utilizing assistive devices. The data collected through interviews and focus group discussions revealed that the school lacks sufficient modern assistive devices for both teachers and students. For instance, it was reported that the assistive tools that are available in the school were not enough for all students and most of them use analog systems and not digital ones. It was reported that those that are available in school are used only in the school compound and students and their teachers are not allowed to take and use them at home. This circumstance had been reported by (SVI-18 G7) as claimed:

> "The school is lacking these devices. The few we have are just used here in school. We are not allowed to take them home except A4 Frames and voice recorders"

Teachers were of the same views as one reported:

> "We have the lack of assistive devices, especially the modern ones" (PST-3).

The same response had been revealed through the interview with the IEO. He proclaimed:

> "We are suffering from the lack of assistive tools especially modern tools where most of them are not affordable because they are so expensive"

Through observation, the study witnessed an embosser and a few Orbit Reader 20 as the new and modern assistive technological devices that are not normally used.

The findings of the study showed that the lack of assistive devices has been widely acknowledged by the majority of participants involved in the study, especially teachers who themselves have visual impairments. They asserted in their responses that the school suffers from a shortage of teaching and learning materials, specifically Braille books, which are important for both teachers and students. They further contended that most of the available books are in regular writing, making it difficult for teachers with visual impairment to use them while preparing for their lessons. Additionally, they mentioned that even the syllabus they use is not in Braille, forcing them to rely on assistance from their sighted colleagues, which poses difficulties. One of the TVI responded:

> "We are facing a shortage of teaching and learning materials in Braille format. Unfortunately, even the syllabus we use is not tailored for teachers with visual impairment. Recently, our sighted colleagues received training on a new syllabus, but we are still waiting for our turn without any knowledge of when it will happen. Additionally, there are tools like the orbit reader 20 that we are unable to utilize, even though they are accessible to some sighted teachers"

Under the same circumstances, the school also lacks important assistive tools that are widely used worldwide. They recommended that the outdated analogue systems they currently have be replaced with modern ones. In their response, students vehemently claimed that they were not permitted to bring certain tools home. Only the A4Frames and voice recorders can be taken outside of school, while Braille machines are off-limits. This limitation hinders students from effectively utilizing these tools, impeding their educational advancements and accomplishments. The study findings resemble Kiomoka (2014), Diasse and Kawai, (2024), Mnyanyi (2009), Ngonyani (2010), Mbwambo (2025), Mwakyambiki (2018), and Wilson (2016) when reported that, schools accommodating students with visual impairment suffer from lacking important assistive tools. The limitations were compounded by the lack of educational resources, which posed significant challenges for both teaching and learning, ultimately leading to decreased student engagement in classroom activities.

Based on these illustrations, the findings indicated that despite the government and its partners' efforts in supporting and providing assistive devices, the ongoing challenges of lacking such devices and learning materials continue to hinder effective teaching and learning for students with visual impairments. Studies demonstrated that a lack of assistive devices significantly impacts the teaching and learning process for students with visual impairments.

5.2.2 Malfunctions of the Devices

Malfunctioning means not working properly. The respondents reported malfunctioning as one of the barriers they face while utilizing assistive technological tools. When the study asked how it happens, the participants responded that it happens when the machine is broken or when the paper gets stuck when typing. They further added that the machine got broken when a student collided with the machine and fell it down as (SVI-18 G7) who seemed interested in the discussion responded that:

> "One of the challenges we face is sometimes our Braille machine gets broken. This happens when a student collides with the machine when he passes by it as you see we are many in the class. The second challenge is when the paper sticks in the machine"

Malfunctions of the devices are another barrier facing students with visual impairment in their learning. The findings of the study reported that these often occur when the devices are accidentally collided with or dropped. The respondents have identified a potential reason for these issues, which is the high number of students in the classroom. This leads to an overcrowded space with multiple rows of desks, making it difficult for students to navigate through. Consequently, a student may inadvertently collide with a device and cause it to fall and break while trying to pass through a narrow space.

In the same phenomenon, the participants asserted that the malfunctioning was a result of the paper getting stuck. This presents a significant obstacle for students with visual impairments, making it difficult for them to resolve the problem. They suggest that when this occurs, they must seek assistance from their teachers, who appear to have numerous tasks to attend to before resolving the problem. Based on these illustrations, it appeared that students with visual impairment lack certain skills in repairing the Braille machines, thus relying on their busy teachers for assistance.

The findings further revealed that, when an assistive device experiences a malfunction, it can greatly impact the teaching and learning process for students with visual impairments. This can manifest in various negative effects, including the disruption of learning flow due to unexpected interruptions during lessons or activities. Additionally, it can diminish their independence, leading them to rely on others for assistance. This situation can also result in feelings of frustration and anxiety, causing them to miss out on valuable learning opportunities. Furthermore, there is a loss of time and increased distractions as a result of these malfunctions. The study findings pertain to Bahati (2023). The study indicated that the school faces malfunctions of the devices as the assistive technologies currently available are non-operational as a result of breakdowns and a lack of repair.

5.2.3 Limited Skilled Teachers

Skilled teachers in teaching especially students with visual impairment are very important. Through the data collected from interviews, most of the participants reported that there is a problem with few skilled teachers in the school. This was revealed when one of the teachers responded that:

> "We are lacking skilled teachers in our school. This gives us a hard time dealing with all students in the class of 80 to 90 students because of the workload we have. You have to teach here and run to another class in time" (PST-2).

IEO had the same views as he argued that:

> "There is a lack of skilled teachers especially those who can deal with these students with visual impairment"

The respondents claimed that there are few teachers especially skilled teachers of the student population and their educational needs. Teachers responded that they have a low level of skills dealing with these students with visual impairment and if they think of increasing their education, they have to seek it far away such as Tanzania Mainland, Uganda or abroad something difficult for them. This is because there is no university in the country which provides these skills at degree level or further levels as one of the teachers claimed:

> "Our educational level dealing with students with special needs is low, and when we want to increase it we have to follow it in Tanzania mainland, Uganda or abroad" (PST-2).

The study findings indicated that the school is currently facing a deficiency in proficient teachers. The findings revealed that the school needs more qualified teachers as the number of skilled teachers was insufficient compared to the student population. It was found that even the teachers with visual impairments were not adequately trained to teach students with similar impairments. They admitted that they lack the necessary skills to teach students with visual impairments and only do so because they share the same disability. They rely on their personal experiences to guide their teaching. In the same regard, teachers claimed that their educational skills dealing with students with visual impairment are limited, and when they think of developing it have to go to mainland Tanzania, Uganda or abroad hence it poses them with a difficult time. Consequently, due to the limited specialized teachers, students with visual impairment are being taught by regular teachers and a few skilled teachers who encounter various challenges in adapting their lessons to meet the needs of each student.

These findings are consistent with the studies conducted by Ngonyani (2010), Mnyanyi (2009), Mwakyambiki (2018), Kiomoka (2014) and Wilson (2016). The studies highlighted the shortage of qualified

teachers for students with visual impairments in primary schools as a result; it minimizes the inclusion race in mainstream schools. According to the illustration provided, students who have visual impairments face significant barriers in their academic environments, leading to difficulties in the successful implementation of inclusive education. Various factors including insufficiently trained staff have been identified as hindrances to the learning process in inclusive settings. These obstacles are impeding the effective execution of inclusive education. Kachweka and Rupia (2022) emphasize that this scenario not only complicates teaching and learning for teachers but also poses challenges for students seeking assistance from their teachers, who may lack the necessary training to utilize teaching resources effectively.

5.2.4 Overcrowded Classes

Overcrowding classes seems as the main barrier for students with visual impairment. The situation was reported in interviews when the participants seemed to be annoyed by the situation. Likewise, overcrowded classes have been reported as the main source of machine malfunctioning since students hardly move from one area to another, as a result, they may collide with the machine and fall it as reported by (SVI-18 G7):

> "Sometimes our Braille machine gets broken. This happens when a student collides with the machine when he passes by it"

Teachers came with the view that overcrowded classes make them miss extra time to help the students particularly those with visual impairment as (PST-2) addressed the issue:

> "Sometimes we miss an extra time to help them as you see these students need extra care especially when it comes a time of assisting them in using assistive tools"

The study findings indicated that the school is experiencing overcrowded classrooms. Through observation, the study noted that classes were filled with a large number of students ranging from 80 to 90 students. Teachers expressed that this situation made it difficult for them to work and teach effectively. Students with visual impairments were particularly affected as they required additional time for both skill development in various subjects and technical assistance with devices. Furthermore, the findings revealed that overcrowded classes were one of the factors contributing to device malfunctions. This occurred when a student accidentally collided with the machine, causing it to fall and break. The findings reported that broken devices posed significant challenges for students with visual impairments. Firstly, it delayed their ability to complete their notes promptly. Secondly, it took a long time to get the device fixed as it relied on the assistance of busy teachers. Lastly, it exacerbated the shortage of availability and accessibility. Considering these circumstances, the findings suggest that overcrowded classes create obstacles in the teaching and learning processes, particularly for students with visual impairments. Therefore, addressing overcrowding is essential for creating an inclusive learning environment. Schools should consider strategies such as smaller class sizes to enhance the educational experience for all students, including those with visual impairments.

The study findings align with Ngonyani (2010), Mnyanyi (2009), Mwakyambiki (2018), Lynch, Lund and Massah (2014) and Chaurembo (2016). These studies highlighted the issue of overcrowded classrooms. The analyses revealed that classroom overcrowding hinders effective follow-up, classroom management, and successful teaching and learning. Overcrowding classes has been witnessed as one of the major challenging factors in facilitating inclusivity in mainstream schools. Both students and teachers can be negatively affected by this situation. Likuru & Mwila (2022) assert that in overcrowded classes, the teaching and learning process is impacted, especially for students with visual impairments. In their arguments, they affirm that, in crowded classrooms, the noise levels tend to increase significantly. According to them, increased noise can make it more difficult for students to concentrate, which in turn affects their learning outcomes. According to Walden University (n.d), chaotic classroom environments are also harder for teachers to manage when overcrowded. It suggests that the larger number of students increases the likelihood of disruptive behaviour and conflicts among students. It argues that teachers in crowded classrooms often spend more time addressing behavioural issues and less time on actual teaching, which is not conducive to effective learning. It further states that the factors that can contribute to a poor learning environment involve various aspects such as inadequate air conditioning, heating systems, lighting, ventilation, indoor air quality, acoustics, and physical security.

In line with the above illustrations, the findings of the current study indicated that it was difficult to effectively manage and cater to the needs of all students in such classes. Teachers reported that a large number of students in their classes were unable to dedicate extra time to help students with visual impairments. This is primarily due to their heavy workload and the need to quickly move on to another class.

5.2.5 Limited Technical Skills in Assistive Devices

Most of the participants responded that they lacked technical skills on some of the devices, especially those that seemed new and modern. They proclaimed that there are some new assistive devices such as Orbit Reader 20 which was recently brought into school. SVI-17 claimed that:

> "We are in a difficult time using new devices such as Orbit reader 20 which were recently brought into our school"

Teachers seemed to have the same view as one quoted saying:

> "Some tools are much more difficult to use because of lacking technical skill"

IEO agreed also in lacking technical skills for both teachers and students on the new devices as he commented that:

> "Ee...Mh…you know times change and technology changes too, our teacher suffer from technical know-how skills on some of the assistive devices such as orbit readers… others they don't know even how to use Braille machines"

The findings of the study indicated that the participants have a lack of technical skills when it comes to using assistive devices. They mentioned difficulties specifically with the new Orbit Reader 20 that was introduced in the school. Both teachers and students were found to be ineffective in utilizing this device. Furthermore, some respondents mentioned that there are teachers who struggle to properly use the Braille machine.

Based on these findings, it can be concluded that the use of assistive technology in the school being studied is not efficient. To improve the utilization of assistive tools and promote inclusivity and effective teaching and learning to enhance academic achievement for students with visual impairments in this school, it is necessary to provide technical training. Various studies, including those conducted by Eliuteri and Lema (2022), corroborate the findings of the study. The studies indicated that nearly all teachers at the inclusive school examined in these studies encountered difficulties when attempting to utilize assistive devices for students with visual impairments. The studies revealed that teachers lacked the necessary knowledge and skills to effectively use and teach students with visual impairments, impeding their ability to provide quality education. Therefore, the lack of technical skills training in utilizing assistive devices for teaching and learning to students with visual impairments hinders their effective achievement (Fernández-Batanero *et al*., 2022).

5.2.6 Absence of Efficient Transport Systems

Students with visual impairment are claiming improper transport. They argued that they find themselves in a difficult time when it comes time to go or come back to school. They normally are taken by their relatives when they have time to do so, or else, they have to use public transport which, they are considered as a burden to Daladala conductors. This situation is portrayed by SVI-18 as she proclaimed:

> "Also we suffer from permanent transport. We have to use Daladala in which we are being seen as a burden by conductors and say rude words to us as "sikuwezi" (I can't take you)"

When a study asked why, the SVI restated that:

> "Maybe because of our blindness. Our parents do not have transport. Sometimes they take us to school and take us back home when they have time" (PST-3).

The absence of efficient transport for students with visual impairment emerged in the study. According to the respondents, these students often experience inadequate and unreliable transportation to and from school. Students claimed that, normally they rely on their relatives to send them to school and bring them back when they have time. However, when their relatives are unavailable, students with visual impairment are forced to use public transportation, where they face various challenges such as encountering rude remarks or being denied transportation as they are considered as a burden. This situation puts them in a challenging position and hinders their educational achievements. Mwakyambiki (2014) also documented a similar situation. The study revealed that children with disabilities encountered discriminatory and prejudiced language on their way to and from school, which discouraged them from attending. In the same regard, Lynch, Lund, and Massah (2014) found that the majority of children in mainstream schools have encountered name-calling and bullying at some point in their lives.

These illustrations highlight the fact that the absence of efficient transportation for students with visual impairments can lead to several barriers. These barriers may include increased truancy, missing out on important lessons that cannot be easily repeated, losing hope, and feeling marginalized, among others. Equally, the study conducted by Mwakyambiki (2014) and Kiomoka (2014) highlighted the absence of efficient transportation for students with physical disabilities to get to school. In these studies, it was found that these children often arrive late to classes due to the lack of reliable means of transport, resulting in a significant amount of time being lost during travel.

Based on the above illustrations, the lack of effective transportation systems can have a significant impact on students with visual impairments. These students often depend on public transportation to travel to school. When transportation systems are inefficient or inaccessible, it restricts their mobility and independence. This can make it difficult for students to attend classes regularly, engage in extracurricular activities, or access educational resources. Navigating unfamiliar environments can also pose safety risks for students with visual impairments as inadequate transportation infrastructure can lead to accidents or discomfort. According to Miyauchi (2020), efficient transport systems help facilitate social interactions and community engagement. Without accessible transportation, students may miss out on social events, field trips, and other educational outings, leading to social isolation that can impact their overall well-being and academic experience.

Moreover, unreliable transportation can directly impact students' attendance, resulting in late arrivals or missed classes that disrupt their learning process. This can create gaps in knowledge, affect grades, and hinder academic progress. Therefore, efficient transport systems are essential for promoting equal opportunities and ensuring that students with visual impairments can fully participate in education and activities outside the classroom.

Today, advanced assistive technology is being used to teach and help students with visual impairments. These are various devices like screen readers, Braille displays, OCR technology, audiobooks, educational apps, magnification software and voice recognition software that effectively improve the learning experience for students with visual impairments. These technologies enable students to access digital content, interact with educational materials, and control their computers, ultimately enhancing their ability to learn independently (Tebo & Ed, 2009); Manis, 2020).

Integrating the latest assistive technology in teaching and learning can significantly enhance educational opportunities for students with visual impairments in Zanzibar Primary School. By incorporating screen readers, Braille displays, OCR technology, and other innovative tools, the school can create a more inclusive learning environment that addresses the diverse needs of its students. These technologies not only improve access to educational materials but also empower students with visual impairments to engage more fully in their studies and achieve their academic goals. Embracing these advancements will contribute to a more equitable education system, fostering an environment where all students have the opportunity to succeed.

In conclusion, to effectively support students with visual impairments in the classroom, teachers need to undergo training and stay updated on technological advancements, pedagogical approaches, and subject-specific knowledge. This preparation equips them with the necessary skills to provide practical learning support and contribute to the personal, professional, and productive development of these students (Sze, 2019).

6. CONCLUSION AND RECOMMANDATION

Based on the findings of this study, it can be concluded that assistive technology plays a great role in enhancing the academic achievement of students with visual impairments. This is because; assistive technology empowers these students to achieve their educational goals since they can perform educational tasks which seemed unachievable before starting to use assistive devices. However, this advancement is still facing many barriers that affect the academic achievement of students with visual impairment in Zanzibar primary schools. In light of these findings, it is evident that certain efforts should be taken to improve the utilization of assistive technology for students with visual impairment to boost their academic achievement. Thus, for effective utilization of assistive technology for students with visual impairments in Zanzibar primary schools, the government in collaboration with other educational stakeholders should intensify their efforts and commitment to providing adequate and relevant personnel and materials resources and eliminate the mentioned barriers to make sure that students with visual impairments are equally learning as that of their fellow sighted students.

ACKNOWLEDGEMENTS

This article is a part of the first author's study, for a master's programme at The State University of Zanzibar (SUZA). I would like to express my heartfelt and enduring appreciation to my co-authors Dr. Abdalla Abu Shaame and Dr. Said Khamis Juma for their joint contributions and guidance.

REFERENCES

- Adeke, A. R. (2019). The role of educational technology in teaching reading to learners with visual impairment in inclusive primary schools in Kumi municipality, Kumi district (Doctoral dissertation, Kyambogo University (un published work).
- Akiyoo, F., Mosha, H., & Ogoti, E. (2022). Adequacy of Teaching and Learning Resources for Implementing Inclusive Education in Primary Schools in Arusha Region, Tanzania. *International Journal of Innovative Research and Development*, *11*(2).
- Bahati, J. K. (2023). Use of assistive technologies in teaching and learning of learners with visual impairment in primary schools in kasulu district, Tanzania (Doctoral dissertation, Kyambogo University [unpublished work]).
- Bornman, J. (2020). Human Rights and Visual impairment. In Ferreira, R &Sefotho, M (eds.), Understanding Education for the Visually Impaired (Opening EyesVolume 1), pp. 47–77. CapeTown.AOSIS. https://doi.org/10.4102/aosis.2020.BK179.03
- Brown, C. M., Packer, T. L., & Passmore, A. (2013). Adequacy of the regular early education classroom environment for students with visual impairment. *The Journal of Special Education*, *46*(4), 223-232.
- Chaurembo, H. (2016). Assessment of Teachers Skills in Supporting Visually Impaired Children in Primary Schools in Dar es salaam Region, Tanzania (Doctoral dissertation, The Open University of Tanzania).
- Diasse, M. D., & Kawai, N. (2024). Barriers to curriculum accessibility for students with visual impairment in general education setting: The experience of lower secondary school students in Senegal. *The Curriculum Journal*.

- Eliuteri, R., & Lema, V. (2022). Assessing the Access to Assistive Devices by Special Education Need Students in Morogoro Municipality. *East African Journal of Education Studies*, *5*(3), 288-300.
- Fernández-Batanero, J. M., Montenegro-Rueda, M., Fernández-Cerero, J., & García-Martínez, I. (2022). Assistive technology for the inclusion of students with disabilities: a systematic review. *Educational technology research and development*, *70*(5), 1911-1930.
- Grönlund, Å., Lim, N., & Larsson, H. (2010). Effective use of assistive technologies for inclusive education in developing countries: Issues and challenges from two case studies. *International Journal of Education and Development using ICT*, *6*(4), 5-26.
- Hemed, R. I. (2019). Education situation in Zanzibar. Oditor, 32.
- Juma, R. K., & Ntulo, G. R. (2024). The Availability and Use of Assistive Technologies among Pupils with Hearing and Visual Impairments in Zanzibar. *International Journal of Education and Development using Information and Communication Technology*, *20*(1), 63-77.
- Juma, S. (2018). Developing inclusive education policy and practice in Zanzibar: Collaborative action research (Doctoral dissertation, University of Jyväskylä).
- Juma, S., & Mussa, L. (2024). Transitioning Special Education Self-Contained Special Units into Learning Support Bases for Inclusion: The Case of Zanzibar Primary Schools. *International Journal of Whole Schooling*, *20*(1), 55-82.
- Kachweka, A., & Rupia, C. (2022). Examining Visual Impairment Challenges on Special Needs Pupils‟ Academic Achievement in Bukoba District, Tanzania. *J Adv Educ Philos*, 6(7), 388-399.
- Kiomoka, D. (2014). Children with Visual Impairments in Tanzania. An investigation of the Challenges which Children with Visual Impairments face in Learning and Participation in Inclusive Primary schools (Master's thesis).
- Kisanga, S. E., & Kisanga, D. H. (2022).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*, *17*(7), 791-800. https://doi.org/10.1080/17483107.2020.1817989
- Lancioni, G., & Singh, N. (2014) Assistive Technologies for Improving Quality of Life.In Lancioni, G., & Singh, N. (Eds.). Assistive Technologies for People with Diverse Abilities. Autism and Child Psychopathology Series. Doi:10.1007/978-1-4899-8029
- Lane, H. (1976). The wild boy of Aveyron (Vol. 149). Harvard University Press.
- Likuru, L., & M Mwila, P. (2022). Overcrowded classrooms: effect on teaching and learning process in public secondary schools in Ilemela Municipality, Tanzania. *Asian Journal of Education and Social Studies*, *30*(2), 75-87.
- Lynch, P., Lund, P., & Massah, B. (2014). Identifying strategies to enhance the educational inclusion of visually impaired children with albinism in Malawi. *International Journal of Educational Development*, 39, 216-224.
- Manis, M. (2020). Enabling Full-service and Special School Teachers Working with Visually Impaired Learners. In Ferreira, R., & Sefotho, M. (eds.), Understanding Education for the Visually Impaired (Opening Eyes Volume 1), pp.147–183. CapeTown. AOSIS https:// doi.org/10.4102/aosis.2020.BK179.06
- Mbwambo, A. B. (2015). Teachers' attitudes towards inclusive education in regular primary schools in Tanzania (Master's thesis).
- Miyauchi, H. (2020). A systematic review on inclusive education of students with visual impairment. *Education sciences*, *10*(11), 346.
- Mnyanyi, C. B. (2009). Developing teachers' work for improving teaching and learning of children with visual impairment accommodated in ordinary primary schools. *European Educational Research Journal*, *8*(2), 336-351.
- MoEVT. (2006). Zanzibar Education Policy. Ministry of Education and Vocational Training Zanzibar.
- Morelle, M. (2016). Challenges experienced by learners with visual impairment in two mainstream primary schools in Klerksdorp, Dr. Kenneth Kaunda District. Unpublished master's thesis, University of South Africa.
- Mwaijande, V. T. (2014). Access to education and Assistive devices for children with physical disabilities in Tanzania (Master's thesis, Oslo and Akershus University College).
- Mwakyambiki, S. E. (2018). Challenges of Children with Disabilities in Access to Education: A Case of the Selected Primary Schools in Dar es Salaam, Tanzania. *Journal of Co-operative and Business Studies (JCBS)*, *3*(2), 110.
- Ngonyani, M. S. (2010). Teachers' facilitation of learning for learners with disabilities in inclusive Classrooms in Tanzania: Teachers' use of interactive teaching methods in inclusive classrooms (Master's thesis).
- Ngundo, L., & Muriithi, W. (2023). Enhancing Academic Achievement in Inclusive Educational Settings: Perceived Influence of Assistive Technology Devices for Learners with Low Vision in Ruchu and Ithiru ward, Kandara Constituency. *Journal of Education and Practices*, *3*(3), 60-70. ISSN 2617-5444 (ONLINE) & ISSN 2617-6874 (PRINT).
- Possi, M. K., & Milinga, J. R. (2017). Special and inclusive education in Tanzania: Reminiscing the

past, building the future. Educational Process: International Journal, 6(4), 55-73.

- Reindal, S. M. (2010). What is the purpose? Reflections on inclusion and special education from a capability perspective. *European journal of special needs education*, *25*(1), 1-12. https://doi.org/10.1080/08856250903450806
- Safford, P. L., & Safford, E. J. (1996). *A history of childhood and disability*. Teachers College Press.
- Sen, A., & Nussbaum, M. (1993). Capability and well-being. The quality of life. *Nussbaum, Sen, A.(Eds.), Oxford, Clarendon*.
- Shanker, A., & Kant, R. (2021). Assistive technologies for visually impaired: Exploring the barriers in inclusion. *Research Highlights*, *8*(3), 70.
- Sze, S. (2019). An Investigation of Various Types of Assistive Technology (AT).
- Tebo, L. R., & Ed, M. (2009). A resource guide to assistive technology for students with visual impairment. Capstone project, Bowling Green State University.
- Terzi, L. (2005). A capability perspective on impairment, disability and special needs: Towards social justice in education. *Theory and research in education*, *3*(2), 197-223. https://doi.org/10.1177/1477878505053301
- UNICEF, (2021) Situation analysis of Children and Young People with Disabilities in Mainland Tanzania and Zanzibar.
- Walden University (n.d) 5 Ways That Overcrowded Classrooms Affect Education**.**
- Wilson, L. (2016). Challenges Facing Children with Visual Impairment in Accessing Inclusive Primary Education: A Case of Uhuru Mchanganyiko Primary School, Dar es Salaam, Tanzania (Doctoral dissertation, The Open University of Tanzania).
- World Health Organization, & United Nations Children's Fund. (2022). Global report on assistive technology. World Health Organization.