University of Dar es Salaam Library Journal
Vol 20, No 1 (2025), pp 226 - 239
ISSN: 0856-1818

Enhancing High-tech Assistive Technology Use for Learning among Students with Visual Impairment in Tanzania's Higher Education

Sarah Ezekiel Kisanga
University of Dar es Salaam
Email: sarah.kisanga@udsm.ac.tz

Abstract

Despite the growing global recognition of the value of assistive technology (AT) for students with visual impairments, a significant research gap remains in understanding the specific factors that hinder the use of high-tech AT and effective strategies for overcoming these barriers. This study examines the factors that hinder the use of high-tech assistive technology (AT) and explores strategies to enhance its utilisation among students with visual impairments in higher education institutions (HEIs) in Tanzania. A cross-sectional survey design was employed to collect data from 64 students with visual impairments across three HEIs using both closed and open-ended questionnaires. Descriptive statistical analysis was used to analyse the data. The findings indicate that the primary factors hindering the use of high-tech assistive technology include limited knowledge and training (80%), inadequate availability of high-tech devices (41.8%), and technophobia (30.9%). Additional factors identified were high costs (25.5%), a lack of skilled trainers (25.5%), and negative attitudes towards high-tech AT (16.4%). Based on these findings, the study recommends: the provision of comprehensive training for both teachers and students, and an increase in the availability and accessibility of high-tech assistive devices in HEIs. There is also a need to provide both moral and material support, such as certificates for students, and to employ specialised IT professionals to conduct training sessions. The study emphasises the importance of fostering a supportive learning environment to promote the effective use of high-tech AT among students with visual impairments in HEIs. Institutional support and policy enhancements are also recommended to ensure sustainability. By systematically addressing these hindrances, educational institutions can dismantle barriers to participation, directly contributing to equity by levelling the playing field for students with visual impairments

Key words: Visual impairment, Assistive Technology, High-tech assistive technology, Higher education

https://dx.doi.org/10.4314/udslj.v20i1.13

Introduction

Assistive technology (AT) has emerged as a vital tool in fostering learning and participation in inclusive education for students with visual impairments (Kisanga &Richards, 2018; Kisanga & Kisanga, 2022). AT encompasses a range of devices and software that enhance the learning experience by providing tools that compensate for functional limitations, ultimately fostering greater independence and access to educational resources (Argyropoulos & Thymakis, 2014; Silman et al., 2017; Kisanga & Kisanga, 2022; Vincent et al., 2024; URT, 2024). These technologies offer a multitude of possibilities for individuals with visual impairment (VI) to access opportunities that were previously inaccessible or highly restricted

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ISSN: 0856-1818

(Rizk & Hillier, 2022; Nyavor & Amaniampong, 2020). By providing essential support, AT empowers these students to participate fully in academic strides and bridges the gap between their abilities and the challenges they face.

In the contemporary era, technology has permeated various aspects of teaching and learning, revolutionising educational practices. Educational institutions worldwide have adopted digital learning environments that foster interactive and personalised learning experiences. For instance, countries like Finland have implemented advanced educational frameworks that leverage technology to support diverse learners, including those with disabilities. Finland's national education philosophy prioritises inclusive learning environments that foster equal opportunities and offer tailored support to help every student reach their full potential (EASNIE, 2023). The integration of technology into the classroom has opened up new avenues for personalised instruction, enhanced accessibility, and innovative learning experiences. The benefits of AT for students with VI are manifold; it promotes engagement in the learning process, facilitates access to information, and enhances communication skills (Adebisi et al., 2015; Bacalla et al., 2024; URT, 2024). Tools such as screen readers, braille displays, and audio textbooks can significantly improve academic performance and social inclusion. In addition, recent innovations such as AI-driven object recognition and scene description tools, including Microsoft's Seeing AI, Google Lookout, and Envision Glasses, enhance users' ability to identify objects and interpret their surroundings in real-time (Naayini et al., 2025; Yao et al., 2025).

Factors Hindering the Use of Assistive Technology among Students with Visual Impairment

Despite the undeniable benefits of AT in supporting students with VI, its usage is shaped by a range of factors that can be broadly categorised as intrinsic and extrinsic influences. Intrinsic factors include individual traits like self-motivation, self-confidence, attitudes, and acceptance of disability (McDonnall & Sui, 2024). Students' intrinsic motivation for using a particular assistive device is rooted in their awareness and knowledge of its benefits, which resonate with their individual interests, needs, and pre-existing attitudes. Students' attitudes towards their disability, their knowledge and competence in using technology, and their expectations of its efficacy can significantly influence their decision to adopt AT.

Students with VI may exhibit a spectrum of attitudes towards AT, ranging from positive embracement of its potential to enhance learning (Ari & Inan, 2010; Mbugua et al., 2022; Kisanga, 2025) to negative resistance due to various factors. One common factor contributing to rejection is the perceived shortcomings of AT devices. Students may encounter limitations or challenges in using certain technologies, leading them to reject their adoption. Rogers (2003) identified two types of rejection: active rejection, where students initially consider using a technology but later decide against it, and passive rejection, where students never contemplate utilising the technology in the first place. Literature consistently demonstrates that individuals can make informed decisions about technology adoption after assessing the technology's capabilities and potential benefits (Davis, 1989; Rogers, 2003; Nyavor & Amaniampong, 2020; Dos Santos et al., 2022).

On the other hand, extrinsic factors also play a significant role in the adoption and utilisation of AT. Institutional support, availability of appropriate AT devices, and access to training

and technical assistance are vital for fostering an environment conducive to the effective use of assistive technology (Davis, 1989; Venkatesh et al., 2003; Teo, 2009). For example, assistive technologies for students with VI in American universities are characterized by varying limitations, including a lack of familiarity with practical applications, a tendency among users to prioritise advantages over disadvantages, limited piloting experience among AT developers, and a lack of planned professional development or capacity building initiatives for AT applications (Senjam et al., 2021; Philemon & Amos, 2024).

Other extrinsic factors that hinder the effective use of assistive technologies for students with VI include the lack of professional development for teachers and students, resulting in insufficient training on how to utilise these technologies effectively (Watermeyer et al., 2023; URT, 2024). In Morocco, Tahiri (2023) reports technical challenges related to the application and implementation of ATs, which further complicate the situation, indicating that existing devices may not adequately meet the specific needs of students with VI. Moreover, both Cameroon and Namibia experienced challenges related to the usage of assistive technologies for students with VI. In Cameroon, funding limitations resulted in a significant lack of ATs, leading to increased failure rates in the Biology subject. In Namibia, Mungunda (2023) found that the absence of suitable ATs impeded learning for students with VI, contributing to widespread academic difficulties. In Sub-Saharan Africa, including Tanzania, the integration of AT is gradually gaining traction, but systemic, infrastructural, and cultural barriers continue to limit its widespread and practical implementation (Philemon & Amos, 2024; Mungunda, 2023).

In Tanzania, the government has made notable efforts toward the use of AT through policies such as the National Assistive Technology Strategy (URT, 2024). However, challenges persist. Many institutions face a shortage of high-tech AT devices, under-trained staff, and limited funding for technological upgrades (Philemon & Amos, 2024; John & Stackus, 2025). The majority of assistive services rely on donor-supported programs, resulting in inconsistencies in service availability, particularly across rural campuses (WHO & UNICEF, 2022; URT, 2024). WHO & UNICEF (2022) remarked that a limited variety of assistive products, inadequate distribution of technology providers, and underdeveloped infrastructure in rural or remote areas present significant obstacles to the accessibility and effective use of assistive technologies. Moreover, digital literacy remains a critical barrier among students with VI, who often lack access to structured training on using available tools (Luvale, 2025). These factors underscore the multifaceted challenges that must be addressed to enhance the utilisation of assistive technologies among students with visual impairments.

Strategies Enhancing the Use of High-Tech Assistive Technology among Students with Visual Impairment

Addressing the challenges hindering the utilisation of ATs, particularly high-tech AT, among students with VI in higher education institutions (HEIs) requires the implementation of strategies at both the institutional and individual levels. Globally, efforts have been made to promote the adoption of AT, especially in developed regions such as Europe, America, Canada, and Finland. These countries have established comprehensive support systems, including specialised training programs and accessible learning environments, to support their citizens. At the institutional level, implementing training programs for both educators and support staff is crucial. Opoku et al. (2023) emphasised that training programs should be implemented for teachers across the United Arab Emirates (UAE) to assist students in using

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respective assistive devices. Such programs foster a culture of technological acceptance and integrate ATs into daily teaching practices. Educational institutions must invest in training for teachers to ensure that they have the necessary knowledge and skills to guide students with VI in using high-tech AT effectively.

At the individual level, students with VI require access to assistive technologies, such as educational software, hardware, and web-based resources. These technologies may include touch-screen technologies, large-screen monitors, optical scanners, specialised keyboards, and headsets with microphones, as well as screen readers, speech-to-text converters, and browser add-ons that provide easy access to magnification or talking dictionaries (Cummings, 2011; Nyavor & Amaniampong, 2020). In addition, students with VI may benefit from other materials like Optical Braille Recognition (OBR) software which enables users to read Braille documents on a standard A4 scanner by scanning the document, analysing the dot pattern, translating the text, and presenting it on the computer screen (Nyavor & Amaniampong, 2020).

Access to assistive technology among students with VI should go hand in hand with comprehensive training. A significant barrier to AT use is the limited knowledge of the benefits and/or the use of AT among students with VI (WHO, 2011; Kisanga & Kisanga, 2020). Kisanga and Kisanga (2020) recommend both formal and informal training, where the institution itself organises formal training through the centre/unit that provides support services to these students. The study further emphasises that the formal training should be provided regularly and the duration should be long enough to help students master the essential skills. The informal training involves peer tutoring, where students with more experience in using AT assist their peers (Kisanga &Richards, 2018; Kisanga & Kisanga, 2020). Initiatives to raise awareness about AT and provide affordable options are crucial. Collaborative efforts between the government, NGOs, and educational institutions are essential to bridge the digital divide and ensure equitable access to AT for students with VI.

The Problem

Despite the recognised importance of assistive technology for students with visual impairments, research has identified reluctance among these students to use high-tech AT, due to various barriers that hinder its usage (McDonnall & Sui, 2024; Venkatesh et al., 2003; Teo, 2009; Ari & Inan, 2010; Kisanga & Kisanga, 2020; Fernández-Batanero et al., 2022; Watermeyer et al., 2023). Addressing these barriers is essential to promote the use of high-tech AT among these students. While the previous studies on AT have primarily focused on access to and the benefits of AT (Douglas et al., 2011; Silman et al., 2017), as well as attitudes towards its use (Aytekin & Isiksal-Bostan, 2019; Olumorin, 2022; Aslan, 2018; Memet & Şentürk, 2021; Uluyol & Aslan, 2022; Kisanga, 2025), there has been less emphasis on the specific factors that hinder the use of high-tech AT and the strategies for overcoming these barriers.

While international literature has highlighted the transformative impact of AT in inclusive learning (Ari & Inan, 2010; Nyavor & Amaniampong, 2020; Vincent et al., 2024), there remains a paucity of context-specific research in Tanzania that explores both hindrances and practical strategies to promote AT adoption. Most existing Tanzanian studies (e.g., Kisanga & Kisanga, 2020; Philemon & Amos, 2024) focus on isolated institutions, providing limited

analysis of broader systemic factors. This research bridges this gap by conducting a multi-institutional study that reflects the diversity of contexts across Tanzanian higher education.

Objectives

This study examines the factors hindering the use of high-tech AT and the strategies to enhance its usage through a cross-sectional survey of three higher learning institutions. Specifically, the study aims to:

i. Examine the internal and external factors hindering the use of high-tech ATs among students with VI.
ii. Explore the strategies that enhance the utilisation of high-tech ATs among students with VI.

Materials and Methods

The study is primarily quantitative, employing a cross-sectional survey design to examine the factors hindering the use of high-tech assistive technologies and strategies to enhance their utilisation among students with visual impairments in higher education institutions in Tanzania. This approach aligns with the research questions because the study aimed to identify and measure factors hindering AT use and explore strategies to improve utilisation. These objectives align with a quantitative survey method, which is suitable for gathering perceptions, frequencies, and trends across a specific population. A total of 64 students with visual impairments were purposefully selected from three institutions (Cohen et al., 2018). The three institutions were selected based on their enrolment of students with visual impairments and provision of support services, including assistive technology devices. Out of the 64 students with visual impairments, 33 had low vision and 31 were totally blind. The participants were distributed across three higher education institutions in Tanzania, with 33 from the first institution, 18 from the second, and 13 from the third. Findings may not be generalizable beyond the three selected institutions due to the small and purposively selected sample. Broader conclusions about all higher education institutions in Tanzania would require a larger, more representative sample.

A closed-ended and open-ended items questionnaire was administered to all eligible students with visual impairments in the three institutions (Bryman, 2016). The questionnaire focused on students' background information, factors hindering the use of assistive technologies and strategies to enhance their utilisation among students with visual impairments in higher education institutions. Open-ended responses were analysed using thematic analysis, which involved coding common themes related to barriers and strategies. Recurring ideas were categorised to complement the quantitative findings and provide deeper contextual understanding.

A descriptive statistical method was used to analyse the data (Cohen et al., 2018). Frequencies and percentages were calculated to examine the factors hindering the use of high-tech assistive technologies and strategies that enhance their utilisation among students with visual impairments. In particular, the analysis aimed to identify the primary factors hindering the use of assistive technologies and to develop strategies to improve the utilisation of high-tech assistive technologies.

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The study adhered to all ethical considerations, obtaining written informed consent from all participants. Participation was voluntary, and students were free to withdraw at any time. Anonymity was ensured by assigning codes instead of names (Cohen et al., 2018). In the context of this study, the term "teacher" is broadly used to refer to an individual who facilitates the teaching and learning of assistive technology within higher education institutions, including instructors and other supporting staff with expertise in the use of AT.

Results

Factors Hindering the Use of High-Tech Assistive Technologies among Students with Visual Impairment

The first research objective attempts to examine the factors hindering the use of high-tech ATs among students with VI. In particular, the participants responded to the question: "In your opinion, what are the factors (or barriers) that may hinder usage of high-tech Assistive Technologies for students with VI?" Out of 64 students, only 55 (85.9%) responded to this question. The responses were analysed to identify the most recurring factors. The findings revealed thirteen (13) factors as summarised in Figure 1:

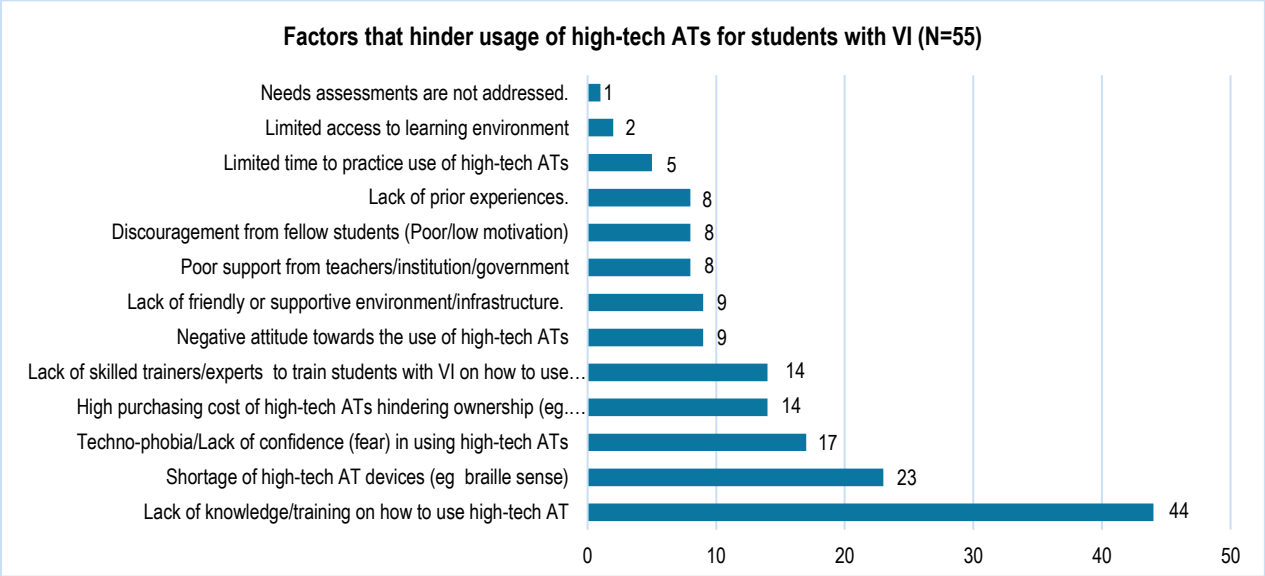

Figure 1: Factors that hinder the usage of ATs for students with VI (*Source: Field data, 2024*)

Figure 1 outlines thirteen factors that hinder the effective utilisation of high-tech assistive technologies (ATs) among students with visual impairments. A total of 55 respondents contributed their insights, identifying several factors that collectively impede the integration of high-tech devices in educational settings.

One of the most significant factors identified is the lack of knowledge/ training on how to use high-tech ATs, with 44 respondents (80%) indicating this as a primary factor. This highlights the crucial need for comprehensive training programs that can equip students with the essential skills to navigate and utilise these technologies effectively. Without proper training, students may struggle to harness the full potential of ATs, thereby limiting their academic success and independence. The lack of knowledge creates a further barrier, as students may

feel ill-equipped to engage with the high-tech assistive technology that could enhance their learning. Compounding this issue is techno-phobia or a lack of confidence in using ATs, reported by 17 (30.9%) respondents. This fear can be a substantial psychological barrier that prevents students from attempting to use available technologies, potentially reducing students' opportunities to participate in learning activities that require ATs fully.
The shortage of high-tech AT devices, such as Braille Sense devices, was also noted by 23 (41.8%) respondents as a significant barrier. This scarcity not only limits access to these essential tools but also exacerbates inequalities, preventing students from fully participating in their educational experiences.

The financial aspect of acquiring high-tech ATs was indicated by 14 (25.5%) respondents, who noted the high purchasing costs associated with devices such as electronic note-takers as a hindrance to ownership. The financial burden of acquiring such technologies can be prohibitive, particularly for students from low-income backgrounds, thereby limiting their full participation in the educational environment.

The findings further highlight the absence of skilled trainers or experts who can provide the necessary instruction on using high-tech assistive technology as another hindrance, which 14 (25.5%) respondents noted. The presence of knowledgeable trainers is essential for fostering an environment where students feel supported and capable of using ATs effectively. This lack of expertise can lead to a vicious cycle, where students do not receive adequate training, develop technophobia, and thus remain unable to utilise the technologies that could support their learning.

Moreover, negative attitudes towards the use of high-tech ATs were cited by nine (16.4%) respondents, indicating a broader cultural barrier that can hinder the acceptance and integration of these technologies. Negative attitudes can originate from a lack of awareness or misconceptions about the capabilities and benefits of ATs, potentially leading to reduced motivation among students to engage with these tools. Similarly, negative attitudes can arise from limited exposure to high-tech ATs, as revealed in this study, where eight (14.5%) respondents lack prior experience with high-tech ATs, which hinders their ability to use them effectively. The lack of a supportive environment or infrastructure also complicates the utilisation of high-tech ATs, with nine (16.4%) respondents pointing to an unaccommodating learning environment, including physical barriers and insufficient support from teachers, institutions, and government entities. Social dynamics further complicate the situation, as noted by 8 (14.5%) respondents, suggesting that negative social dynamics can deter students from using ATs.

One of the interesting findings from this study is the discouragement from fellow students with VI, highlighted by 8(14.5%) respondents, suggesting that students with VI need motivation and encouragement from their fellow peers with VI to use high-tech ATs. This peer dynamic indicates that students need motivation and encouragement from fellow students with visual impairments to feel confident using high-tech ATs. Discouragement can lead to reluctance, further limiting their engagement with these technologies.

Other factors noted include limited time to practice using ATs, identified by five respondents, as well as limited access to learning environments and a lack of needs assessments. Though only one respondent mentioned the latter, it cannot be neglected as it reflects a broader

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systemic issue, indicating that the needs of students with VI are not being adequately evaluated or met by educational institutions. Without a needs assessment, it is unlikely that students with VI will fully develop the skills needed to use high-tech devices effectively.

Strategies Enhancing the Utilisation of High-Tech Assistive Technologies Among Students with Visual Impairment

The second research objective explored the strategies that enhance the utilisation of high-tech ATs among students with VI. The participants responded to the open-ended question: "In your opinion, what strategies could be implemented to enhance the utilisation of high-tech assistive technologies among students with VI in Higher Education Institutions?" Of the 64 students surveyed, only 55 (85.9%) responded to this question. An analysis of these responses identified seven primary strategies as summarised in Figure 2:

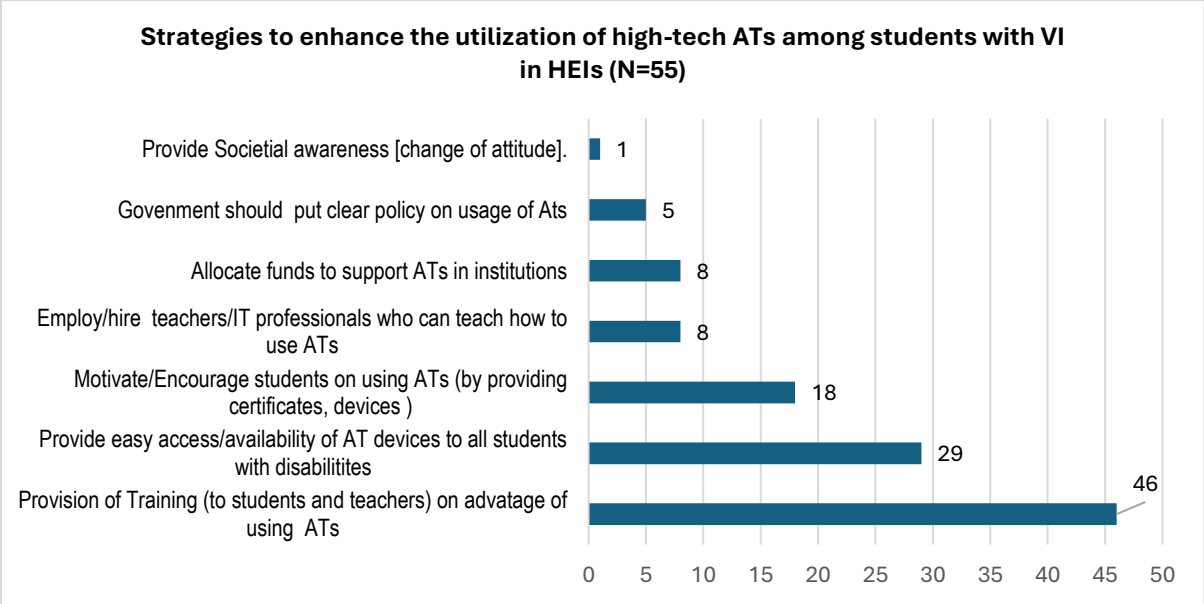

Figure 2: Strategies to enhance utilisation of high-tech ATs for learning among students with VI in HEIs
Source: Field Data (2024)

Figure 2 outlines various learning strategies designed to enhance the utilisation of high-tech assistive technologies (ATs) among students with visual impairments in higher education institutions. The most frequently endorsed strategy is the provision of education and training for both students and teachers (support staff), with 83.6 per cent of respondents supporting this approach. This underscores a crucial recognition that awareness and knowledge about high-tech assistive technologies are foundational to their effective implementation. Training initiatives can equip both educators and students with the necessary skills to maximise the potential benefits of high-tech ATs, fostering a more inclusive educational environment.

Provision of high-tech AT devices is another prominent theme, with 52.7 per cent of respondents emphasising the need for easy access and availability of these tools for all students with VI. This suggests that while awareness and training are vital, the practical aspect of ensuring that students can readily obtain the necessary technology is equally important. The integration of high-tech ATs into academic settings is contingent not only on

understanding their benefits but also on the accessibility of the devices themselves. Encouragement and motivation for students to utilise high-tech ATs ranked third, with 32.7 per cent of the respondents supporting this strategy. Suggestions included providing incentives such as certificates or devices. This reflects a recognition of the psychological barriers that may exist and the need for institutions to actively foster a culture that embraces the use of technology as a tool for empowerment and success among students with VI. Simply providing training is not enough; students also need motivation and encouragement to use these technologies confidently.

In terms of staffing, the hiring of teachers and IT professionals who are adept at instructing students with VI on the use of ATs received support from 14.5 per cent of the respondents. This highlights an important dimension of practical implementation: the presence of knowledgeable personnel can significantly enhance the learning experience and facilitate the smoother integration of technology into academic pursuits.

Significantly, the call for government action in the form of clear policies to support the use of ATs garnered the least support, with only 9.1 per cent of respondents indicating this as a priority. This low percentage may suggest that institutional and immediate strategies are perceived as more pressing than broader policy amendments. Finally, societal awareness and attitude change, which received only 1.8 per cent support, were viewed as less critical in comparison to other strategies. This could reflect an assumption that existing societal attitudes are already conducive to the use of ATs, or it may indicate a belief that systemic changes within educational institutions are more immediately impactful.

Discussion

The study examined the factors hindering the use of high-tech assistive technologies. It explored strategies to enhance their utilisation among students with visual impairments in higher education institutions in Tanzania. The findings of this study reveal several multifaceted factors and strategies related to the utilisation of high-tech assistive technologies among students with visual impairments. The most prominent hindrance is the lack of knowledge on how to effectively use high-tech ATs, a challenge likely stemming from students' limited exposure to such devices during their early education. This is primarily due to an overreliance on low-tech assistive technologies, such as Perkins Braille, in primary and secondary education (Kisanga & Kisanga, 2020; Kisanga, 2025). The results of this study on limited knowledge are consistent with those of Philemon and Amos (2024), URT (2024), Fernandez-Batanero et al. (2022), Kisanga and Kisanga (2020), and Nyavor and Amaniampong (2020), who highlighted limited knowledge and skills of students and teachers as a barrier to effective use of assistive technologies. This recurrent barrier emphasises the need for comprehensive, skill-based education for both students and educators to bridge knowledge gaps and enhance their confidence in utilising ATs. Without these programs, students may struggle to adapt to the rapid advancements in ATs, thereby limiting their academic and personal growth. The shortage of skilled trainers, identified as another related barrier, further complicates the situation. As demonstrated by Senjam et al. (2021), the presence of qualified personnel significantly influences the successful integration of ATs into learning environments.

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Moreover, the study identified another significant barrier: the shortage of AT devices, such as Braille Sense tools. This scarcity is a critical issue, as AT devices are essential for facilitating independent learning and accessibility for students with visual impairments. The findings are consistent with those of Dabi and Golga (2024), Philemon and Amos (2024), Fernandez-Batanero et al. (2022), and Kisanga and Kisanga (2020), who similarly reported the shortage or limited availability of assistive technology tools in educational settings. This issue highlights the logistical and infrastructural challenges that persist across institutions, particularly in resource-limited contexts. The lack of sufficient high-tech devices limits students' access to education, widening the educational gap. The lack of sufficient devices also hinders the broader integration of ATs into the curriculum, contributing to lower student motivation and decreased learning outcomes, as indicated by Fernandez-Batanero et al. (2022) and Philemon and Amos (2024). Furthermore, the reliance on a limited number of available devices often leads to overuse, rapid wear, and inefficiency in catering to the needs of a larger student population with visual impairments.

In addition to the tangible barriers, psychological factors such as technophobia, where students experience fear or discomfort in using ATs for learning, were also noted. This is consistent with Kisanga and Kisanga (2020), who noted that some students, for reasons not fully understood, were hesitant to adopt new technologies, despite receiving training on assistive technology. This highlights the need for a supportive environment that encourages experimentation and familiarisation with the technology. The financial burden of purchasing high-tech devices further limits access, particularly for students and institutions from low-income backgrounds. For instance, some high-tech assistive technologies, such as the Braille Note Touch, can cost approximately US$5,500 (American Foundation for the Blind [AFB], 2016), which may prevent the majority of individuals with visual impairments (VI) from accessing and utilising such technology. This is also supported by Nyavor and Amaniampong (2020) and URT (2024), who indicated that students with VI frequently abandon the use of assistive technology due to the substantial costs of the devices. The negative attitudes toward high-tech assistive technology, poor support, and discouragement from both sighted and non-sighted peers were also notable barriers, each affecting the overall integration of these technologies into students' academic routines. A study by the URT (2024) revealed that approximately 32 per cent of AT users in Tanzania reported difficulty accessing AT, primarily due to insufficient support and the novelty of the technology in the country.

On the other hand, the strategies proposed in this study to enhance the use of high-tech ATs provide a clear pathway to overcoming these barriers. The emphasis on training, supported by 83.6 per cent of the students, aligns with the findings by URT (2024), Philemon and Amos (2024), Vincent et al., (2024), Nyavor and Amaniampong (2020) who recommended regular training to be provided to teachers and students with VI for effective utilization of AT. Training can simplify the complexities of assistive technology, thereby reducing technophobia related to new technologies.

Furthermore, the majority of respondents emphasised the need to improve access to AT devices, which is essential for fostering an inclusive educational environment. Access to high-quality and affordable assistive technologies is also a fundamental component of the United Nations Convention on the Rights of Persons with Disabilities. Article 20 (b) of the Convention emphasises "Facilitating access by persons with disabilities to quality mobility aids, devices, assistive technologies and forms of live assistance and intermediaries, including

by making them available at affordable cost" (UN, 2006, p. 14). These findings are further supported by the WHO (2018), which argues that without AT, individuals with disabilities are frequently marginalised, isolated, and trapped in poverty, increasing the burden of disability. Encouraging students through incentives may also serve to combat technophobia and increase engagement with ATs. Confidence-building exercises, mentorship opportunities, and group learning environments could reduce the fear associated with technology and encourage students to take full advantage of ATs. Interestingly, only 9.1 per cent of the participants prioritised governmental policies, suggesting that more immediate institutional interventions are viewed as more pressing than broader policy changes.

Generally, the results from this study reveal a strong consensus on the necessity of education and training as the foremost strategy for enhancing the utilisation of high-tech ATs among students with visual impairments in higher education. While access to devices and motivational strategies also garnered significant attention, the relatively low emphasis on policy-making indicates a potential area for further exploration and development. Collectively, these insights highlight the multifaceted nature of implementing assistive technologies in educational settings and the importance of addressing both practical and educational dimensions to support students with visual impairments effectively.

Conclusion and Recommendations

The study identified key factors hindering the use of high-tech assistive technologies among students with visual impairments, including limited knowledge, lack of access to AT devices, financial constraints, and psychological factors such as technophobia. These challenges highlight the multifaceted nature of the issue, where both practical and psychological factors intertwine to restrict the effective utilisation of ATs. To address these barriers, the study suggests targeted strategies such as enhancing training for both students and educators, improving access to AT devices, and creating motivational frameworks that encourage the adoption of technology and use of ATs among students with VI in HEIs. There must be a strong institutional emphasis on self-motivation and self-directed learning. Students must be encouraged to develop their skills in using these technologies. Furthermore, institutions should reevaluate existing regulations that impede the full utilisation of ATs, with a focus on implementing immediate institutional solutions alongside broader policy reforms that promote high-tech AT adoption. Overcoming the barriers to AT utilisation requires a concerted effort from educational institutions, policymakers, and the broader community to ensure that students with visual impairments are not only equipped with the necessary tools but also supported in using them effectively to enhance their academic experiences and personal independence. Institutions should also adopt a more holistic approach to AT training and utilisation. By revising restrictive regulations, enhancing training opportunities, and providing high-tech devices, HEIs can ensure that students with visual impairments are fully empowered to succeed in their academic pursuits. The integration of high-tech assistive technologies into students' daily routines, alongside continuous learning and peer support, will foster greater independence and academic success for students with visual impairments.

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