

STRATEGIES FOR AND CHALLENGES IN IMPLEMENTING UNIVERSAL DESIGN FOR LEARNING: A CASE STUDY OF A PRIVATE UNIVERSITY IN TANZANIA

Jackson Julius Manase¹, Gabriel Walubita², Kenneth Kapalu Muzata³,

¹Archbishop Mihayo University College of Tabora, Department of Special Education Tanzania

²University of Zambia, School of Education, EPSS Dept., Email: easygabby@gmail.com

³University of Zambia, School of Education, EPSS Dept., Email: muzatakenneth@gmail.com

Correspondence: Jackson Julius Manase., Email: jackmanase58@gmail.com

Abstract

As enrolment of students with visual impairments in Tanzanian higher education increases, the need for inclusive teaching methods becomes more pressing. Universal Design for Learning provides a framework to meet these needs. This qualitative case study at a private Tanzanian university explored the strategies and challenges for Universal Design for Learning implementation through interviews and observations involving 12 participants, including lecturers, administrators, and students with visual impairments. Strategies for effective Universal Design for learning implementation include establishing resource rooms, hiring Braille transcribers, providing lecturer training, and creating a university centre for inclusive education. Key challenges identified include inadequate assistive devices, insufficient Braille skills among students with visual impairments and lack of trained lecturers. The study underscores the necessity of ongoing support and resources, particularly for accessible materials in visual intensive subjects. Prioritizing the procurement of assistive devices and up-to-date technology to enhance accessibility and facilitate equal participation in academic activities is essential.

Keywords: Student with visual impairments, Universal Design for Learning, Special Education

1.0 BACKGROUND

In recent years, there has been a marked increase in students with disabilities enrolling in higher education. In Tanzania for example, the University of Dar es Salaam admitted its first two students with visual impairments in 1978 (Bhalalusesa, 2016). By the 2021/2022 academic year, Tanzanian universities had 1,037 students with disabilities, including 517 with visual impairments (TCU, 2022). International policies, such as the Salamanca Statement (1994), the UN Convention on the Rights of Persons with Disabilities (2006), and SDG 4.5 for 2030, advocate for equal educational access (Maenner, 2020). Tanzania's national legislation, including the Disability Act (2010), the University Act (2013), and the Education and Training Policy (2014), supports inclusive education. Consequently, universities are adopting Universal Design for Learning (UDL), which extends Universal Design (UD) principles to instructional practices (CAST, 2011;

Schreffler, Chini & James, 2019). UDL promotes diverse teaching methods to meet varied learning needs and has been shown to improve access to curriculum and assessments for students with disabilities (Westine et al., 2019; Floretta, 2021; Beck, 2022). UDL is built on three principles: multiple means of representation, action and expression, and engagement, ensuring equitable learning opportunities (Boothe et al., 2020).

Effective inclusion requires understanding the range of disabilities and using specialized teaching methods, particularly for students with visual impairments (SwVI). However, many university lecturers lack the necessary training and resources (Haug, 2016; Rushahu, 2017; Munemo & Bekele, 2020; Zhang et al., 2018; Penda, Ndhlovu, & Kasonde-Ng'andu, 2015). Insufficient training and outdated knowledge among educators hinder effective support for SwVI (U.S. Department of Justice, 2020; Moriña, 2020). UDL, which focuses on the learning process itself rather than just access to the educational environment (Hehir, 2009), requires culturally responsive planning and policy implementation (Bedrossian, 2018). This approach involves creating flexible, learner-centered strategies to accommodate diverse needs (Leslie, 2019) and is incorporated into U.S. educational policies such as IDEA and ESSA (Meyer et al., 2014). Struggle for both inclusion and UDL should be taken on simultaneously without waiting for one of the two to be achieved first (Muzata & Johnson, 2019). Although some inclusive practices are present in Tanzanian higher education (Lyakurwa, 2018), the implementation of UDL remains unclear. This study aims to address this gap by exploring the challenges and strategies for implementing UDL to support SwVI in Tanzanian private universities.

1.1 Statement of the Problem

The drive towards inclusivity in higher education is a global phenomenon. In developing countries, it is crucial to pursue inclusion and UDL concurrently, rather than sequentially addressing one before the other (Johnson & Muzata, 2019). While some inclusive practices for SwVI exist in Tanzanian higher education institutions (Lyakurwa, 2018), the knowledge on implementation of UDL remains unclear. This study aimed to address this gap by exploring the strategies for and challenges in implementing UDL to support SwVI in Tanzanian private universities. Enhanced understanding of various disabilities among university disability personnel is essential for ensuring the provision of effective accommodations (Schilling-Dickey, 2022).

1.2 Research Objectives

The objectives of this study were as follow:

- i. To establish the strategies employed by university staff and management for implementing UDL for students with visual impairments.
- ii. To explore the challenges encountered by university staff when applying UDL for students with visual impairments.

1.3 Research Questions

The study was guided by the following questions:

- i. What strategies do university staff and management have for implementing UDL among students with visual impairments?
- ii. What challenges do university staff face in applying the UDL for students with visual impairments in university?

2.0 LITERATURE REVIEW

2.1 Strategies for Implementing UDL for SwVI in Universities

Black et al. (2015) suggested that faculty require training in the principles of universal design to effectively integrate it into their instruction and reduce barriers. The study also recommended that faculty receive training on disability awareness and related issues to diminish attitudinal barriers to education. This

recommendation aligns with Rydeman, Efring, and Hedvall's (2018) proposal to introduce a course module on UDL for teachers, integrating it into regular pedagogical development courses for university educators.

Muzata *et al.* (2019) emphasized the need for universities to establish disability policies to facilitate the implementation of inclusive education for students with disabilities, including those with visual impairments. They also recommended that lecturers participate in sensitization and capacity-building activities related to inclusive education methodologies and curriculum adaptation. Similarly, Amponsah and Bekele (2022) advocated for the development of adaptable and inclusive policies through collaborative and participatory approaches and highlighted the importance of enhancing faculty capacity to support students with visual impairments in online learning.

In Spain, Doménech *et al.* (2023) suggested that for implementing inclusive pedagogy, faculty should consider faculty-student relationships, resources, methodology, reasonable adjustments, mentoring, and evaluation. These findings are consistent with Carballo *et al.*'s (2021) assertion that faculty training supports inclusion, although it is not the sole requirement for developing inclusive practices at the university level.

In Tanzania, Kisanga and Richards (2018) recommended mandatory training for all teachers in inclusive settings, including integration into teacher education curricula for pre-service teachers and the provision of special seminars or workshops for in-service educators. They also highlighted the necessity for educational institutions and educators to adapt institutional cultures, teaching methodologies, and attitudes to better accommodate diverse needs in inclusive educational settings.

Tungaraza (2018) recommended enhancing the Special Education Unit with adequate personnel, equipment, and materials in Tanzania. Additionally, it suggested educating university community members about disabilities to counteract negative attitudes and discrimination. This aligns with Naafia *et al.* (2019), who revealed that the role of resource centres in supporting inclusive education in Bandung city has been suboptimal due to factors such as inadequate facilities, insufficient human resources, delays in service provision, and limited funding. Similarly, Matveieva (2021) in Ukraine underscored the importance of specialists' activities in inclusive resource centres for the personal development of students, the professional activities of teachers, and parental awareness, particularly in remote areas.

2.2 Challenges Faced by University Staff in Applying UDL

In Canada Hills *et al.* (2022) revealed many issues raised by faculty as challenges to the implementation of UDL, including time and resource constraints, a lack of institutional support, and a lack of understanding. Additionally, faculty misconceptions about UDL also serve as a barrier to implementation. Similarly, in Thailand, Bualar (2018) explore the barriers affecting the inclusive higher education participation of blind students. The findings highlighted unfriendly physical environments on campus, lecturers' misconceptions about inclusive education, and inconsistencies in inclusive higher education policies, all of which constrain their opportunities for active learning.

Lintangsari and Emaliana (2020) established that in Indonesia challenges not only arise from the lecturer's belief in the practices of inclusive education, whether they may work or not, but also depend on the lecturer's perspective, skills, and experience in teaching and accommodating students with disabilities in the mainstream context of higher education. In South Africa, Ndlovu (2021) found some challenges facing lecturers in the application of UDL, such as inaccessible infrastructure, lack of adequate funding, unwillingness of faculty members to incorporate UDL practises into their instructional approaches, and lack of knowledge of UDL. Kamaghe (2021) revealed that 67% of respondents were unaware of mobile assistive technologies or integrated assistive technologies on online learning platforms. Additionally, 66% couldn't afford Smartphone, rendering them unable to utilize assistive technologies. This underscores the challenge faced by university lecturers in designing e-learning approaches that are inclusive of SwVI. In Kenya Okumu *et al.* (2021) revealed a low level of mathematics Braille skills among the learners and identified a

significant positive relationship between mathematics Braille proficiency and mathematics performance, particularly among touch readers.

3.0 METHODS

A qualitative approach with a case study design was selected to facilitate an in-depth understanding of participants' perspectives on the implementation of UDL at the study university. This approach allows for knowledge to be derived from interpreting various events and experiences (Creswell, 2014). Case studies qualitatively explore the subject matter, covering all aspects of a single unit comprehensively (Creswell, 2014). It facilitated an in-depth exploration of participants' perspectives on UDL within the context of the selected private university in Tanzania, enabling the collection of detailed data and capturing the complex nuances associated with UDL implementation. A purposive sampling procedure was used to achieve a deep understanding of the study phenomenon rather than seeking to generalize findings (Patton, 2015). Criterion sampling was employed to select 12 participants: 6 lecturers, 4 SwVI, and 2 university administrators (a head of department and a centre coordinator) from the Faculty of Education and Social Sciences at the selected university. The study employed semi-structured interviews and observations. An observation guide was developed to assist in systematically observing the implementation of UDL pedagogies by university staff in supporting the inclusion of SwVI at the selected university. Additionally, semi-structured interviews were conducted using interview guides that outlined key topics of interest (Creswell, 2014). The study employed thematic analysis to derive meaningful insights from the participants' responses. The data was analyzed thematically following the six-step process outlined by Braun and Clarke (Braun & Clarke, 2012).

4.0 FINDINGS AND DISCUSSION

4.1 The University Strategies for Implementing UDL for Swvi

Besides the challenges presented, the study also established some strategies for implementing UDL. The most noted strategies were the establishment of a resource room for special and inclusive education, the establishment of a university centre for inclusive education, hiring of Braille transcribers, ensuring the availability of some assistive devices and technology for SwVI, and investing in seminars and workshops on inclusive education.

4.1.1 Hiring of Braille Transcribers

It was discovered that the university employed Braille transcribers tasked with transcribing Braille materials, such as tests, assignments, and exams, into standard print. Additionally, they undertook other duties, including training SwVI who lacked Braille proficiency, aiding lecturers and students with any Braille-related issues, such as the utilization of Braille devices, and providing reading and writing assistance to SwVI individuals lacking Braille skills during tests and final exams. The head of the department noted

...in our university, we have hired Braille transcribers who help to transcribe Braille dots into normal texts" (Interview with Boke, Tabora town, November 28, 2023).

Additionally, another lecturer insisted:

After writing their exams, their booklets are taken to braille transcribers for transcription before marking; we have special persons employed for Braille transcription and other assistance for students who are blind. (Interview with Njiku, Tabora town, November 28, 2023).

Braille transcription services are crucial for inclusivity in educational settings where SwVI are enrolled (Mulenga & Muzata, 2020). These services bridge the gap between Braille users and non-Braille users, facilitating communication and access to information. Rosenblum and Herzberg (2011) highlight that a diverse group of professionals and volunteers involved in Braille transcription for K-12 students,

demonstrating a broad network of support for SwVI. This aligns with the university's efforts to ensure inclusivity by employing certified and non-certified transcribers. However, Corn and Wall (2002) provide a contrasting view, noting that the reliance on volunteers in 40 states suggests Braille transcription is not seen as a formal career path. This highlights a gap between the recognition of Braille transcription as a professional role and the reality of its practice. The ongoing professional development is crucial for improving Braille transcription services. Mmasi, Muthee, and Murugami (2022) emphasize that sustained practice and professional growth can be supported through adequate funding and capacity-building efforts from the government and stakeholders. This is consistent with the need for better resources and training for Braille transcribers. Furthermore, the use of dedicated software and integration of Braille solutions into existing applications is advocated as a means to enhance Braille services (Mascret, Mille & Guillet, 2012). The incorporation of Braille simulation software is mentioned as a way to potentially shift practitioners' perspectives on Braille transcription, particularly in the context of distance learning. Farrand, Koehler, and Vasquez (2022) argue that making courses accessible and rigorous is essential, suggesting that a combination of technology and human transcribers could improve accessibility for SwVI in higher education. This calls for a balanced approach to improving Braille services in universities, advocating for both technological solutions and professional development for transcribers. The integration of UDL principles underscores the importance of flexibility in designing accessible curricula, whether through the use of Braille-supportive software or human transcribers. Combining these approaches could lead to more effective inclusion of SwVI in higher education settings.

4.1.2 Ensuring Availability of Assistive Devices and Technology for SwVI

Some of the assistive devices and technologies for SwVI noted to be available were Perkins Braille machine, hand frames, pocket frames, tape recorders, computers installed with assistive software such as NVDA and text readers, embosser machines, smart TV for video lessons and improvised tactile teaching aids. It was noted that availability of these devices and materials contributed a lot to implementations of UDL although the university had to invest more on up dated technology and devices for SwVI so as to ensure more improvement in inclusive teaching:

...Apart from that, another university plan is to invest more on up to date assistive technology to simplify and facilitate inclusive teaching for Students with VI. (Interview with Boke, Tabora town, November 28, 2023).

A study by Mgonja and Mwila (2023) and Hehir (2009) underscores the crucial role of assistive technology in implementing UDL, highlighting the need for continued provision of such devices and modifications to school infrastructures. They further argue that improving accessibility and inclusivity through assistive technology and UDL can significantly enhance student performance. Rogers-Shaw et al. (2017) suggest that using technology in universal design can lead to greater inclusivity. Additionally, Studies by White and Robertson (2014), Rose and Meyer (2002), and Satar (2019) advocate for curriculum designs that integrate various technologies, including text-to-speech tools, visual aids for better comprehension, and alternative keyboard options. Johnson and Muzata (2019) emphasize the significance of investing in assistive technologies to enhance curriculum accessibility for learners with special education needs, highlighting it as a crucial element for successful UDL implementation. Despite some universities' investments in assistive devices, further improvements are still necessary, as existing challenges indicate. Advancing this strategy represents a significant step toward achieving genuine inclusiveness. By recognizing the advantages of assistive technology and adopting supportive policies and practices, educational stakeholders can foster more inclusive and equitable learning environments for all students.

4.1.3 Establishment of the University Centre for Inclusive Education

This centre was set up purposefully to ensure that students with disabilities were well accommodated. Serving as the custodian of all inclusive education-related matters at the university, the centre ensured the

availability of teaching and learning materials, assistive devices and technology, and the application of inclusive teaching approaches for students with disabilities. Additionally, it acted as a link between students with disabilities and the university, serving as the focal point where students directed and shared their concerns. One administrator the Head of department stated that:

Another step which we put to ensure inclusive practices in our university is the establishment of the centre for inclusive education. It is like a small unity which coordinates all inclusive issues including teaching and learning methods. Under this centre there is a special desk which accommodates and handles all issues related to inclusive education. (Interview with Sakawe, Tabora town, November 30, 2023).

Another administrator and centre coordinator also commented:

...All these activities are handled by our centre for inclusive education which was established to ensure that students with disability are well accommodated (Interview with Boke, Tabora town, November 28, 2023).

Research by Naafia et al. (2019) underscored the importance of a robust support system in inclusive education, with resource centres playing a pivotal role. These centres provide guidance, training, and advocacy to support inclusive education initiatives in schools and communities. Furthermore, studies by Gunansyah (2016), Nurjannah (2023), and Matveieva (2021) highlighted the role of resource centres in facilitating teacher training, individualized program development, and providing support to students and parents, especially in remote areas. On the other hand, Tungaraza (2018); Kisanga and Richards (2018) suggested that the Special Education centres should be strengthened and equipped with sufficient personnel, equipment, and materials that students require. These facilities not only provide essential services to support students but also offer guidance and training to lecturers, thereby fostering a non-restrictive learning environment. This underscores the importance of investing in inclusive education infrastructure and support systems to ensure the successful implementation of UDL for SwVI.

4.1.4 Capacity Building for Lecturers through Seminars and Workshops on UDL and Inclusive Education

It was noted that some of the lecturers were not well-trained in the area of inclusive education, even though they had courses in inclusive classes with SwVI. This is why this strategy was put in place:

Also, our plan is to invest more in capacity building through seminars and workshops, mentorship exchange and sharing of experiences among members of staff themselves. I think this will be a good way to enhance the application of UDL and Inclusive teaching approaches in general (Interview with Boke, Tabora town, November 28, 2023).

Another participant's Head of department insisted that:

We plan to invest more in seminars and workshops on the application of UDL and inclusive teaching approaches in general. I also think that seminars and training on UDL for lecturers is very necessary because some of lecturers do not have knowledge on how to accommodate students with disabilities (Interview with Sakawe, Tabora town, December 2, 2023).

By investing in capacity-building efforts, the institution is proactively enhancing teaching practices and promoting inclusivity. Research by Carballo et al. (2021) and Brodwin (2015) highlights the significance of faculty training in fostering inclusion and implementing UDL principles. This is supported by Kisanga and Richards (2018) and Tungaraza (2018), who suggest integrating such training into teacher education curricula at all levels. Amponsah and Bekele (2022) further advocate for developing faculty capacity to support students with disabilities in online learning environments, while Muzata (2019) emphasizes the need for sensitization and capacity building in inclusive education methodologies. In Sweden, Rydeman, Efring, and Hedvall (2018) propose incorporating UDL modules into regular pedagogical development courses to reach a broader audience of teachers. This underscores the importance of raising awareness about the UDL framework among faculty members and university boards to foster more inclusive learning environments. The university's initiative to enhance lecturers' skills and knowledge in UDL and inclusive education through seminars and workshops is a crucial step forward. Additionally, incorporating UDL training into teacher education curricula at all levels is recommended to ensure educators are well-prepared to address the diverse needs of students.

4.1.5 Challenges Faced by University Staff in Applying the UDL for Swvi

The study revealed some challenges faced by lecturers when implementing UDL. The most notable challenges included inadequate assistive devices and technology, a lack of Braille skills among some SwVI, overcrowded lecture halls, insufficient training and awareness of UDL and inclusive education among lecturers, and a lack of proficiency in assistive technologies among SwVI.

4.1.6 Inadequate Assistive Devices and Technology for Swvi

The lecturers lack technologies which could simplify and facilitate inclusive teaching. Participants noted that they lack assistive technology devices for teaching mathematics calculations to SwVI. They also noted that it had been difficult for them to describe pictures, diagrams and illustrations to SwVI. Due to this challenge, SwVI were forced to take subjects and courses which do not have mathematical components:

One of the great challenges is when teaching a concept involving diagrams and drawings. It is difficult to instruct VI students on the concept in a diagram. Assistive technology would help the lecturers in applying UDL which can allow multiple choices to VI students is still a great challenge (Interview with Ndakeni, Tabora town, December 2, 2023).

Another lecturer also insisted:

In our university some students are forced to opt for arts subjects because they are not able to do other courses. It has been difficulty for VI students to take Geography because some content in geography requires visual illustrations and they need vision access of information... (Interview with Ngungi, Tabora town, December 2, 2023).

This revelation resonates the finding from the other studies which found that inadequate assistive devices and technology significantly challenge the implementation of UDL for SwVI in higher education, affecting instructors' ability to accommodate diverse needs and raising legal and ethical concerns (Kisanga, 2019; Ndlovu, 2021; Karr et al., 2020). This issue contradicts the Tanzania Disability Act of 2010, which mandates sufficient facilities for individuals with disabilities (URT, 2010) and Johnson and Muzata (2019) call for investment in assistive technologies for UDL success. Further studies revealed that in implementing UDL, lecturers faced challenges such as a lack of options for executive functions such as goal setting, a lack of support professionals to guide lecturers in adapting their teaching, inaccessible environments, and

an absence of effective screening and identification services (Kisanga, 2019; Ndlovu, 2021; Karr et al., 2020). This suggests that despite universities investing in assistive technology for students with disabilities, challenges to full inclusion remain. There is a need for universities to provide more technology that supports the learning of SwVI. Higher education institutions should ensure adequate and sustainable funding for assistive technology to guarantee that SwVI receive the full benefits of their education.

4.1.7 Lack of Braille skills by some of the SwVI

It was established that some of the SwVI were incapable of reading and writing in Braille because they acquired blindness in adulthood something which made them difficult to use sense of touch in reading Braille. They had challenges in using Braille devices such as Perkins Braille machine and hand frames which were the common Braille device at this university. This was a challenge to lecturers and students themselves since Braille was one of the most used alternative modality to SwVI at this university. One of the lecturers noted:

Another challenge is lack of Braille skills for some students with VI. As I told you earlier in my first year class I have two blind Students who acquired blindness in their adulthood so even when you want to give a Braille format as a choice they are not skilful (Interview with Shile, Tabora town, January 2, 2024).

Another SwVI explained:

You know I acquire blindness in my adulthood. It was two years ago so I do not have Braille skills. It is now am learning to use Perkins Braille and Hand frame so I cannot benefit from materials which are in Braille format. I have been assigned a Braille technician to train me so I hope I will master it (Interview with Kidako, Tabora town, January 2, 2024).

Braille skills are essential for ensuring that the curriculum is accessible to SwVI. Okumu et al. (2021) identified a significant positive relationship between Braille skills and mathematics performance, especially among those who utilize touch reading techniques. Kana and Hagos (2024) similarly noted several challenges faced by SwVI in schools, including a lack of inclusive curricula, insufficient Braille knowledge among them, and limited availability of Braille-printed resources and technology. When SwVI lack Braille skills, it is crucial to provide flexible media options and consider alternative accommodations. Educators in higher education institutions should explore various support strategies. Salih (2023) found that SwVI often choose study methods based on the assistive technology they used prior to college. Universities can offer Braille training as an additional support method to SwVI. Martiniello, Barlow, and Wittich (2022) emphasize the importance of providing opportunities for older Braille learners, highlighting that age is less of a barrier than the lack of policy and practical support. In alignment with this perspective, Dogbe (2020) advises teachers to understand their pupils' existing skills, knowledge, interests, and previous experiences to tailor Braille reading activities to individual needs. This implies that university SwVI still have opportunities to learn Braille. Therefore, university management should assess the individual needs of their SwVI and organize Braille training sessions while also offering access to other alternatives, such as audio and non-visual assistive software. Incorporating these provisions into university policies is crucial for the effective implementation of UDL.

4.1.8 Lack of Training and Awareness of UDL among the Lecturers

This study found that a lack of awareness and knowledge of UDL resulted in an unwillingness to apply UDL effectively. As a result, some of lecturers were reported refusing to be recorded while other were also reported to be rigid in assessment modalities such as relaying on Braille only, relaying on typed and printed work only without considering the multiple modalities:

One among the challenges is lack of lecturers' willingness, some of the lecturers are not willing to use multiple ways and this I think is due to lack of training and awareness on persons with disability and inclusive education (Interview with Boke, Tabora town, January 2, 2024).

Another administrator also insisted:

Also some of the lecturers are not flexible enough to accommodate students with VI. For example I have been receiving some cases where lecturers refuse to be recorded while teaching. Some of the lecturers do not have knowledge on how to accommodate students with disabilities (Interview with Sakawe, Tabora town, December 5, 2023).

This deficiency results in resistance to adopting inclusive practices, such as recording lectures or using diverse assessment modalities, which are crucial for accommodating students with disabilities. Some lecturers' adherence to traditional methods, such as relying exclusively on Braille or printed materials, further exacerbates this issue and fails to meet the diverse needs of all learners. These findings are at odds with the Tanzania Persons with Disabilities Act (2010), which mandates that educational institutions provide appropriate support for students with disabilities. Other studies reinforce these concerns, with Ndlovu (2021) identifying similar challenges, including inadequate infrastructure and limited knowledge about UDL and disabilities. Sikoyo et al. (2023) and Lintangari and Emaliana (2020) both underscore the insufficient capacity and training among staff to effectively implement inclusive teaching practices. Hills et al. (2022) also point to barriers such as limited resources and misconceptions about UDL that hinder its adoption. This suggests an urgent need for comprehensive training programs focused on UDL, as highlighted by Muzata (2018), who notes that inadequate preparation in special education can undermine the goals of inclusive curricula. This highlights a significant knowledge gap regarding UDL and its application in supporting students with special needs. It reveals that while some lecturers are unaware of UDL, others have only partial understanding. This underscores the urgent need for comprehensive training to equip educators with the necessary skills and knowledge to implement inclusive education principles and UDL strategies effectively.

4.1.9 Lack of Skills in some Assistive Technologies among SwVI

The current study found that SwVI lack of skills in assistive technologies such as assistive software like NVDA, text reader, computers with word processors, JAWS programs for sound, alt/open book was another challenge to effective implementation of UDL. Lacking skills of assistive technologies restricted them to few choices of learning modalities. Lecturers were also limited on giving them alternatives. One of the lecturers stated:

Some of the students with visual impairment acquired impairments during their adult hood so they cannot use Braille and other assistive technology. It makes difficulty for the lecturers to apply technology since the students cannot use that technology. Some of them also do not know how to use the software related to visual impairment (Interview with Mwai, Tabora town, January 5, 2024).

Another lecturer also noted:

Also some of Students with VI are not capable of using assistive technology and devices such as Perkins Braille machine and talking computers. This is not only for students but also for us lecturers (Interview with Ndakeni, Tabora town, January 5, 2024).

This revelation aligns with findings by Kamaghe (2021) reveal that 67% of respondents who were SwVI were unaware of mobile or integrated assistive technologies available on online learning platforms. This is in contrast to the views of Satar (2019) and Eligi and Mwantimwa (2017), who suggested that Information and Communication Technologies (ICTs) enhance innovative learning, foster independent learning, and promote participatory and collaborative education. This discrepancy implies that designing e-learning approaches for universities can be challenging if they inadvertently exclude SwVI.

Kisanga and Kisanga (2022) proposed that SwVI need encouragement to use modern assistive technology and training to master these tools, which would help reduce their exclusion and reliance on sighted peers. This highlights that while the integration of technology in education is widely advocated as a means to achieve inclusive education, it is essential to ensure that students with disabilities are proficient in using these technologies. Investing in assistive technology should be accompanied by ongoing training to ensure its effective use. Without adequate skills in using these technologies, SwVI may not benefit fully from various learning opportunities that could cater to their needs.

7.0 CONCLUSION

Several strategies have been identified to improve UDL implementation for SwVI. These strategies include establishing university centres for inclusive education, hiring Braille transcribers, providing capacity-building workshops for lecturers, and ensuring the availability of some assistive devices and technology for SwVI. By adhering to these strategies, the university will be better positioned to ensure true inclusion, particularly for SwVI. Despite efforts to align teaching practices with UDL principles, several challenges have hindered effective implementation. These challenges include inadequate assistive devices and technology, insufficient skills in assistive technologies among SwVI, and a lack of training and awareness among lecturers regarding UDL and inclusive education. Consequently, these obstacles suggest that some students, particularly SwVI, are not fully benefiting from these initiatives. Addressing these barriers is crucial to creating learning environments where all students have equal opportunities to succeed. Prioritizing the procurement of assistive devices and up-to-date technology to enhance accessibility and facilitate equal participation in academic activities is essential. Additionally, the university should provide training sessions on assistive technologies and accommodations for both lectures and SwVI to equip them with the skills needed to navigate academic environments independently.

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