

AWARENESS OF UNIVERSAL DESIGN FOR LEARNING AMONG UNIVERSITY STAFF: A CASE OF A PRIVATE UNIVERSITY IN TANZANIA

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Abstract

Enrolment of students with visual impairments (SwVI) in Tanzanian higher education is rising, highlighting the need for inclusive teaching methods. Universal Design for Learning (UDL) offers a framework to address these needs. This qualitative case study at a private Tanzanian university explored UDL awareness among 12 participants, including lecturers, administrators, and SwVI, using interviews and observations. The study found varied understanding of UDL among staff, with some having a strong grasp and others having limited awareness. Despite efforts by lecturers to integrate UDL principles such as using multimedia tools, providing accessible materials, and offering various assessment methods, there is a clear need for enhanced training and resources. The study recommends increasing UDL awareness and training for staff, as well as better support for SwVI through university policies and assistive technologies.

Keywords: Student with visual impairments (SwVI), Universal Design for Learning (UDL), University Staff.

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1.0 INTRODUCTION

Recent years have seen a significant increase in students with disabilities enrolling in higher education. 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, the number of students with disabilities in Tanzanian universities had increased to 1,037, including 517 with visual impairments (TCU, 2022). International policies and treaties, such as the Salamanca Statement (1994), the United Nations Convention on the Rights of Persons with Disabilities (2006), and Sustainable Development Goal 4.5 for 2030, advocate for equal educational access for persons with disabilities (Maenner, 2020). Complementing these global

frameworks, national legislation in Tanzania, including the Disability Act (2010), the University Act (2013), and the Education and Training Policy (2014), mandates inclusive educational opportunities. This has led to more inclusive university classrooms that accommodate diverse learning needs, including those of SwVI (Griful-Freixenet, Struyven, Verstichele & Andries, 2017). To effectively address this diversity, higher education institutions are adopting Universal Design for Learning (UDL), which extends the principles of Universal Design (UD) to instructional practices (CAST, 2011; Schreffler, Chini & James, 2019). UDL emphasises diverse instructional methods to meet varied learning preferences and needs, and research shows it significantly enhances access to the curriculum and assessments for students with disabilities (Westine, Oyarzun, Ahlgrim-Delzell, Casto, Okraski, Park, & Steele, 2019; Floretta, 2021; Beck, 2022). The approach calls for the application of three core principles: multiple means of representation, action and expression, and engagement, ensuring that all students have equitable learning opportunities (Boothe, Lohmann, & Owiny, 2020).

Assisting university students with disabilities requires not only an understanding of qualification procedures but also a deep awareness of the range of disabilities eligible for services. Specialised teaching methods are essential for SwVI, necessitating that university instructors in inclusive classrooms are well-informed about each student's unique challenges and needs (Haug, 2016). Lecturers play a crucial role in the success of inclusive education and must be skilled to effectively support SwVI. However, in Tanzania, there is a shortage of qualified lecturers and essential teaching resources, with many educators lacking expertise in special education (Rushahu, 2017). Similarly, in Ethiopia, Munemo and Bekele (2020) found that lecturers struggle to adapt their teaching for SwVI due to insufficient training in inclusive practices. Zhang, Rosen, Cheng and Li (2018) highlight that in China, university lecturers often lack the necessary skills and understanding to effectively support students with disabilities, particularly those with visual impairments. These challenges are also evident in Zambia, where traditional teaching methods are found to be inadequate for SwVI (Penda, Ndhlovu, & Kasonde-Ng'andu, 2015). These issues are compounded by insufficient training and outdated knowledge among many university lecturers, as noted by the U.S. Department of Justice (2020) and Moriña (2017), who both stress the need for up-to-date professional competencies and inclusive teaching practices. Haug (2017) and Molina, Perera Rodriguez, Melero, Cotán, and Moriña (2016) further emphasise that lecturers must be skilled in inclusive education techniques, while Schilling-Dickey (2022) points out the need for better understanding of disabilities to ensure appropriate accommodations.

Hehir (2009) distinguishes between inclusive education, which focuses on access to the educational environment, and UDL, which emphasises access to the learning process itself. UDL requires thoughtful planning and policy implementation to ensure strategies for engagement are culturally responsive (Bedrossian, 2018). This approach allows educators to use inclusive design principles to create flexible, learner-centred strategies that better accommodate diverse needs (Leslie, 2019). UDL seeks to provide equitable learning opportunities for all students, including those with special educational needs (Johnson & Muzata, 2019). Research by Floretta (2021) and Bonetti & Noel (2022) underscores UDL's effectiveness in enhancing inclusion, particularly for SwVI in higher education. UDL principles are integrated into U.S. educational policies such as IDEA and ESSA (Meyer et al., 2014), and should be pursued alongside inclusion efforts in developing countries (Muzata & Johnson, 2019). Although there are some inclusion practices for SwVI in Tanzanian higher education (Lyakurwa, 2018), UDL is not yet well established. This study aims to fill this gap by exploring UDL awareness among university staff and visually impaired students.

The drive towards inclusivity in higher education is a universal phenomenon. In developing countries like Tanzania, it is crucial to pursue inclusion and UDL concurrently, rather than sequentially addressing one before the other (Muzata & Johnson, 2019). While some inclusive

practices for students with visual impairments exist in Tanzanian higher education institutions (Lyakurwa, 2018), studies report challenges such as inadequate provision of accessible learning materials, limited curriculum adaptations to accommodate diverse learning needs, and a lack of professional competence in managing inclusive classrooms among lecturers, hence relying on traditional instructional approaches that inadequately address learner variability. As a result, SwVI continue to experience challenges in accessing instructional content, engaging in classroom activities, and demonstrating their learning through appropriate assessment methods. These challenges raise concerns about how inclusive teaching approaches are being implemented in classroom practices to promote equitable learning opportunities for all students, including those with VI. Most of the studies from Tanzania focus on challenges facing SwVI and teacher preparedness for inclusive education, leaving a gap in how university staff understand and integrate the UDL principles into their instructional practices in higher learning institutions in Tanzania. This study sought to bridge this gap by investigating the awareness of UDL among university staff at a selected private university in Tanzania. Enhanced understanding of various disabilities among university disability personnel is essential for ensuring the provision of effective accommodations (Schilling-Dickey, 2022).

This study was conducted at a selected private university in Tanzania. The institution was purposively selected because it offers degree programmes in special education and admits students with visual impairments into various programmes. The study involved lecturers, administrators, and SwVI, and was guided by an interpretivist paradigm using a qualitative case study design to explore the understanding and application of UDL practices in supporting inclusive teaching and learning.

The study was guided by two research questions, which were;

- i. How do university staff understand UDL?
- ii. How do university staff implement UDL-related pedagogical practices to support the inclusion of students with visual impairments in higher education classrooms?

2.0 LITERATURE REVIEW

2.1 Awareness of UDL among the University staff

In South Africa, Chiwandire (2020) revealed that due to a lack of training and knowledge, lecturers failed to adequately support SwVI in the curriculum, and some struggled to operationalise UDL principles in designing and delivering their curriculum. In Saudi Arabia, Alzahrani (2022) revealed that faculty members perceived themselves as knowledgeable about UDL and expressed readiness to integrate UDL principles into their teaching methods. The study found no statistically significant differences in faculty members' knowledge levels of UDL based on their current position or years of experience. Similarly, in Sweden, Häggblom (2020) established that UDL is described as a student-focused approach to learning and teaching, as well as a way to promote greater student involvement. Participants in this research saw UDL as a strategy to enhance inclusion and a tool for administration to effectively expand students' involvement in education. In Chicago, Mavrovic-Glaser (2017) found that 55% of participants claim to be familiar with UDL and 55% of teachers claim to use UDL in their classroom regularly. Also, the participants were regularly using strategies in teaching and learning, a process that reflected what is advocated in UDL by CAST. In contrast, Fornauf and Erickson (2020) revealed that ambiguity still exists regarding UDL's application as either an intervention or framework. This ambiguity also carries implications for its use in advancing inclusive pedagogy in higher learning institutions. Bonetti and Noel (2022) demonstrated that despite the potential for a sustainable built environment, key stakeholders have a limited understanding of UDL. Similarly, Lyakurwa (2019) found that UDL knowledge was not among the approaches explicitly advocated in the selected higher education institutions in Tanzania.

2.2 UDL pedagogies applied to facilitate supportive inclusion of SwVI

Wang and Liu (2024) found that video lectures enhance accessibility for students with disabilities through features like closed captioning and audio descriptions, supporting an inclusive learning environment. In Namibia, Sheyapo (2017) noted that while many lecturers used strategies to include SwVI, some neglected UDL practices, such as forgetting materials or failing to provide detailed descriptions for visual content. In Tanzania, William (2023) indicated that while the books were suitable for SwVI, they lacked sufficient tactile illustrations and pictures. Additionally, most teachers reported a lack of appropriate pedagogy for addressing the needs of students with special needs in inclusive classrooms. Similarly, Mgonja and Mwila (2023) reported that special needs teachers provided support in terms of giving large print notes and setting special exams. However, assessments and individualised educational programs were not performed effectively. Kisanga and Richards (2018) found that Tanzanian lecturers primarily use traditional lecture methods due to large class sizes, with oral descriptions being more beneficial for SwVI compared to multimedia projectors, which often lack sufficient verbal support. Muzata, Simalalo, Kasonde-Ng'andu, Mahlo, Banja, and Mtonga (2019) similarly reported issues at the University of Zambia, where projector use was problematic for SwVI, who struggled with speed and visibility of content. Eligi and Mwantimwa (2017) assessed ICT accessibility at the University of Dar es Salaam, noting that ICTs facilitated innovative and collaborative learning but highlighted gaps in SwVI support. Kisanga and Kisanga (2022) found that while SwVI were familiar with assistive technology, their understanding was limited to available devices at their institutions. Kirboyun *et al.* (2024) emphasised that human readers' communication skills significantly influenced SwVI performance in mathematics, pointing to a reliance on low-tech assistive devices due to limited access to high-tech options.

3.0 THEORETICAL FRAMEWORK

This study is underpinned by the Universal Design for Learning (UDL) framework, as articulated by CAST (2011, 2018, 2024) and elaborated by Rose and Meyer (2002) and Meyer, Rose, and Gordon (2014). UDL is a research-based educational framework that guides the design of instructional goals, methods, materials, and assessments to accommodate the wide range of learner variability in any classroom. Rather than a single, uniform approach to teaching, UDL provides principles that enable educators to create flexible, learner-centred environments that reduce barriers to learning and provide equitable opportunities for all students, including those with disabilities such as students with visual impairments (SwVI).

The UDL framework is organised around three core principles, each of which addresses a distinct dimension of the learning process (CAST, 2011; Boothe, Lohmann, & Owiny, 2020; Meyer *et al.*, 2014):

Multiple Means of Representation: This principle concerns what is taught. It requires educators to present information and course content in a variety of formats (e.g., text, audio, video, Braille, tactile graphics, multimedia) so that learners with diverse sensory, perceptual, and cognitive profiles can access and comprehend the material. For SwVI, this principle is particularly critical because it directly addresses the need for alternative modes of access to instructional content that is typically delivered visually.

Multiple Means of Action and Expression: This principle concerns the how of learning. It requires educators to provide learners with varied ways of demonstrating what they know and can do (e.g., written, oral, Braille, recorded, project-based, or technology-assisted responses). This principle challenges the reliance on a single assessment format and supports flexible, individualised assessment arrangements for SwVI.

Multiple Means of Engagement: This principle concerns the why of learning. It requires educators to recruit and sustain learners' interest, motivation, and effort through varied and

culturally responsive instructional strategies (e.g., group work, seminars, hands-on activities, online resources, audio-recorded lectures, advance provision of notes). For SwVI, engagement is enhanced when teaching practices deliberately include them and avoid exclusionary language or practices.

UDL rests on several assumptions that are directly relevant to this study:

Learner variability is the norm, not the exception. All learners differ in their sensory, cognitive, affective, and physical abilities; therefore, instruction must be designed from the outset to accommodate this diversity rather than retrofitting accommodations for individual students (Rose & Meyer, 2002; CAST, 2024).

Barriers reside in the curriculum, not in the learner. When students fail to access learning, the problem lies in the design of instructional materials, methods, or assessments—not in the students' deficits (Hehir, 2009; Meyer et al., 2014).

Access to the learning process, not merely the environment, is the goal. UDL distinguishes itself from mere physical inclusion by emphasising access to the processes of learning, engagement, and assessment (Hehir, 2009; Bedrossian, 2018).

Proactive design is preferable to reactive accommodation. UDL encourages educators to anticipate learner diversity during planning rather than making ad hoc adjustments after barriers emerge (Boothe et al., 2020).

Inclusive education and UDL are complementary and should be pursued concurrently, especially in developing contexts (Muzata & Johnson, 2019; Johnson & Muzata, 2019).

The UDL framework foregrounds this study in several important ways:

First, it provides the conceptual lens for defining what UDL awareness means. The study's first research question: How do university staff understand UDL? is directly framed by the three UDL principles. The interview and observation guides were designed to elicit participants' definitions of UDL, their ability to identify the three principles, and their understanding of UDL as a framework for accommodating all students, including SwVI. The findings were then interpreted in light of whether participants' conceptions aligned with or diverged from the UDL principles articulated by CAST (2011, 2018).

Second, it structures the analysis of pedagogical practices. The study's second research question, How do university staff implement UDL-related pedagogical practices to support the inclusion of SwVI? is organised around the three UDL principles. The results are presented in three corresponding categories: (a) pedagogical practices aligned to means of representation (e.g., multimedia smart TVs, PowerPoint with verbal descriptions, Braille, audio formats, slower teaching pace); (b) pedagogical practices aligned to means of engagement (e.g., soft-copy notes, audio-recorded lectures, online materials, group work, seminars); and (c) pedagogical practices aligned to means of expression (e.g., Braille examinations, oral tests, read-aloud accommodations, audio-supported assessment). This structure enables a systematic evaluation of the extent to which staff practices reflect UDL principles in supporting SwVI.

Third, it provides the normative standard against which gaps are identified. By comparing observed and reported practices against the UDL principles, the study can identify where staff awareness and implementation are strong (e.g., provision of soft-copy notes, use of Braille in assessment) and where they are deficient (e.g., lack of clear verbal descriptions, refusal to be recorded, inadequate computer skills among some SwVI, inconsistent application of UDL).

This normative dimension is essential for generating the study's recommendations for continuous professional development in UDL and inclusive pedagogy.

Fourth, it connects the study to the broader international and national policy context. UDL is embedded in international frameworks such as the Salamanca Statement (1994), the UN Convention on the Rights of Persons with Disabilities (2006), and Sustainable Development Goal 4.5, as well as national legislation in Tanzania, including the Disability Act (2010), the University Act (2013), and the Education and Training Policy (2014). The UDL framework thus provides a coherent theoretical bridge between global inclusive education commitments and the day-to-day instructional practices of university staff in Tanzania.

Fifth, it acknowledges the contextual realities of developing countries. As Muzata and Johnson (2019) and Johnson and Muzata (2019) argue, inclusion and UDL must be pursued simultaneously in developing contexts rather than sequentially. The UDL framework is therefore not applied prescriptively but adaptively, recognising that resource constraints, large class sizes, and limited assistive technology may shape how UDL principles are enacted. This aligns with the study's interpretivist paradigm, which seeks to understand how staff make sense of and implement UDL within their specific institutional context.

In summary, the UDL framework provides the theoretical foundation for this study by defining the principles against which staff awareness and pedagogical practices are assessed, structuring the presentation and analysis of findings, and linking the study to broader inclusive education policy and practice. It is the most appropriate framework for a study that seeks to explore how university staff understand and implement UDL to support the inclusion of students with visual impairments in higher education.

4.0 METHODOLOGY

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 a 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 generalise 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 were analysed thematically following the six-step process outlined by Braun and Clarke (Braun & Clarke, 2012).

5.0 RESULTS AND DISCUSSION

5.1 University staff understanding of the meaning of UDL

The present study found that UDL was defined in various ways, with multiple definitions. However, one commonality in those definitions was "accommodating the needs of all students in the class." All provided definitions of UDL showed that its target is to accommodate all students in a class:

UDL as a teaching model designed to accommodate all students:

It is a teaching model that focuses on using multiple ways of engagement, expression, and representation. It replaces the one-size-fits-all approach with various teaching approaches so that every student can benefit from what is taught. (Boke)

UDL as an inclusive teaching approach designed to meet the needs of all students:

I define it as an inclusive teaching approach that aims to accommodate all learners, including those with disabilities. (Ndekani)

The same insight was given by an administrator who noted that:

It's a teaching approach that accommodates all students, including those with disabilities, through multiple teaching approaches and the use of technology. (Sakawe)

UDL as an educational framework used to accommodate the needs of all students in the class:

I know it as a framework that is used to accommodate the needs of all students in the class through multiple means of representation. (Njiku)

Although the majority of university staff were noted to understand UDL by giving definitions reflecting UDL practices, it was also established that a few of them were unaware of UDL because they provided definitions not reflecting UDL practices:

I know UDL as instructional approaches that are universally designed and can be applied anywhere. They are supposed to be similar and should meet the purpose. They are used everywhere in learning. (Mwai)

It was found that some lecturers and administrators were aware of three principles of UDL, though a few participants were not able to identify those principles:

I know that there are three principles of UDL. I remember multiple means of representation, multiple means of engagement, and multiple means of expression. I'm not sure if I'm right or wrong. (Ndekani)

On the other hand, the other lecturers seemed to be unaware of UDL principles because they were not able to identify the UDL principles:

As I told you earlier, UDL is an instructional approach that is universally designed and can be applied anywhere. I don't know much about its principles (Mwai)

The findings indicate a mixed understanding of Universal Design for Learning (UDL) among university staff, with some demonstrating a clear grasp of UDL principles and their application in inclusive teaching, while others show varying levels of awareness or misinterpret UDL's definitions. This inconsistency mirrors prior research, such as Westine et al. (2019) and

Alzahrani (2022), which found that faculty generally understand UDL but often struggle with its implementation. Häggblom (2020) noted that faculty at Kristianstad University viewed UDL as a student-centred approach, and Mavrovic-Glaser (2017) reported that 55% of university lecturers in Chicago were familiar with UDL and used it regularly. However, Alqurani and Rao (2018) highlighted that UDL principles are rarely applied and collaboration among educators is limited. This lack of uniformity in definitions and practices may lead to some educators unknowingly applying UDL or confusing it with other approaches, a concern supported by Fornauf and Erickson (2020), who observed significant ambiguity about UDL's role as either an intervention or a framework. This suggests a need for clearer definitions and more comprehensive training to ensure effective and consistent implementation of UDL principles.

There was a revelation that some lecturers at this university were not aware of UDL, which negatively impacted its application for SwVI. This lack of awareness and subsequent reluctance to use UDL in teaching reflects challenges similar to those identified by Chiwandire (2020) in South Africa, where insufficient training hindered support for SwVI. Additionally, research in Tanzania by Bonetti and Noel (2022) and Lyakurwa (2019) revealed the low level of understanding of UDL among key stakeholders. Dempsey et al. (2023) also observed that while many educators were not fully familiar with UDL, they recognised some of its elements in their curricula, indicating an unintentional integration of UDL components in their teaching practices. This indicates the need for more training and capacity building in UDL and inclusive education in general. While university staff possess considerable theoretical and practical knowledge about UDL, they require formal training to effectively implement UDL in inclusive settings.

5.2 UDL-related Pedagogical Practices to Support the Inclusion of Students with Visual Impairments in Higher Education Classrooms

The most pronounced responses relating to the UDL pedagogies applied by university staff to support the inclusion of SwVI culminated in the formation of themes that are in three categories based on the principles of UDL, which are means of representation, means of engagement, and means of expression.

5.2.1 Pedagogical Practices Aligned to Means of Representation

In terms of representation, the most pronounced responses were linked to: the use of multimedia smart TVs for video lessons and internet-based videos like YouTube, the use of more than one teaching approach, which included participatory lectures with questions and answers, the use of PowerPoint projectors with verbal descriptions, and teaching at a slower pace.

One administrator noted:

For students with visual impairments, we provide materials in Braille format, soft copy, and audio format using audio recorders and talking programs... We also have multimedia smart TVs which lecturers use to conduct video lessons and online tutorials. (Boke)

Another lecturer explained:

I normally use PowerPoint. Since they cannot use their sense of vision, I have to teach at a low pace. I should teach slowly so that they can grasp the concept. We also have a smart TV in our resource room, so sometimes we use it to conduct video lessons and YouTube tutorials. Using the smart TV, I can access internet-based videos which are up to date. (Mwai)

On the other hand, SwVI seemed to be not satisfied with the way lecturers were representing their course content, reporting the use of PowerPoint projectors without clear oral explanations and the use of lecture methods at a high pace to the extent that some SwVI were not able to take notes in Braille:

Another thing I want to add is about lecturers showing concern. When teaching, they should keep in mind that there are visually impaired students in the class. Some lecturers teach too fast to the extent that you cannot even take notes. (Keku)

Another SwVI added:

You know, most lecturers prefer to use projectors. Some of them provide clear explanations, while others do not. Some may use words that are not inclusive; for example, a lecturer may ask, 'Have you seen this?' In such cases, we feel excluded. (Kidako)

Research by Gauvreau *et al.* (2019) supports the use of diverse formats to meet different learning needs. Wang and Liu (2024) also highlight that video lectures can be beneficial for students with disabilities. However, Sheyapo (2017) noted that poor-quality videos and lack of detailed descriptions in Namibia limited their effectiveness, stressing the need for inclusive standards like closed captioning and audio descriptions. Kisanga and Richards (2018) found interactive lectures beneficial compared to traditional methods. However, Muzata *et al.* (2019) and Sheyapo (2017) noted challenges for SwVI, including the speed of lectures and inadequate materials. Effective participatory lecturing requires flexibility, inclusivity, and a supportive environment. Using PowerPoint projectors with verbal descriptions was also highlighted as a beneficial strategy. While this method improved comprehension for SwVI, issues arose when information was presented too quickly or lacked sufficient verbal descriptions. Smith and Johnson (2023) found verbal descriptions enhanced learning for SwVI, but Muzata *et al.* (2019) and Kisanga and Richards (2018) observed that over-reliance on visual aids without adequate oral support could marginalise SwVI. This underscores the need for inclusive practices and careful implementation of technology to ensure all students benefit from the educational content. There is still room for improvement in ensuring that all teaching methods are accessible, inclusive, and conducive to the learning needs of SwVI.

5.2.2 Pedagogical Practices Aligned to Means of Engagement

Approaches revealed under means of engagement were: provision of handouts in soft copy; recorded audio notes; searching and reading online materials; group work and seminar presentations.

i. Provision of Lecture Notes in Soft Copy

Lecturers were sending soft copies of lecture notes to SwVI through email or WhatsApp in advance. After receiving them, SwVI were accessing those notes using Job Access With Speech (JAWS) programs like Alt/OpenBook, NonVisual Desktop Access (NVDA), and text readers. One of the lecturers noted:

...I provide them with notes in soft copy so that they can read them through text reader software on their computers or phones, though in our resource, there are talking computers which they also use. (Njiku)

The head of department also commented:

For students with VI, we provide materials in Braille format, soft copy and audio format using audio recorders and talking programs. (Boke)

However, a few participants noted that it was difficult for some of the SwVI to access notes in soft copy because they were not familiar with text reader software:

After getting notes in soft copy, I normally find my fellow sighted student to read them for me loudly while recording them. Although in our resource room there are talking computers which can help me to read my notes, I do not use them because I do not have computer skills. (Chao)

Based on these findings, a comprehensive approach to accessibility is evident in the provision of lecture notes in soft copy, catering to SwVI at the university. The use of text reader software and other assistive technologies facilitates independent learning for SwVI, as highlighted by both lecturers and students themselves. However, challenges persist for some SwVI who lack familiarity with these technologies. This finding supports the notion put forth by Andersen and Rogers (2018) that students should have access to a range of tools enabling them to engage with the curriculum independently. Research conducted by Davis and Day (2010) as well as Tanni (2014) emphasised that individuals with severe vision impairments can effectively utilise auditory and tactile technologies such as screen readers, touch typing, Braille, and auditory recordings to facilitate their access to educational content. Similarly, Muzata (2021) argued that advancements in technology enable both groups of SwVI to access educational materials through various assistive devices like talking computers, talking calculators, and computerised software such as speech-to-text and text-to-speech, as well as Braille refreshers. Additionally, Black *et al.* (2015) established that university SwVI emphasised the importance of having multiple options for receiving learning materials, including instructor-prepared notes, notes prepared by student volunteers, recorded class lectures, alternative media, and hard-copy textbooks. However, contradicting these findings, it was also noted that at this university, a few SwVI who lack computer skills failed to access notes in soft copy. This is consistent with William (2023), who observed that learning materials lacked sufficient tactile illustrations and pictures, rendering them unsuitable for SwVI. This observation aligns with the findings of Kisanga and Richards (2018), who reported instances where SwVI were excluded from the learning process due to certain lecturers refusing to be recorded during lectures.

i. Provision of Lecture Notes in Audio Form

It was observed that during lectures, SwVI were using their phones to record the lectures. SwVI were easily interacting with course content by listening to lectures they recorded. This helped them when preparing for tests or final exams. SwVI revealed that lecture notes in audio form were beneficial to them because it was difficult for them to write everything in Braille format:

I normally allow them to record my lectures so that they can listen to them later on during their own time. (Ngungi)

Although most of the lecturers seemed to be comfortable and willing to be recorded, SwVI reported a case whereby some lecturers refused:

What we do is just to record lectures ourselves for some lecturers because some of them don't want to be recorded. They refuse to be recorded. For example, one day there was a lecturer who told me If you are recording me, I will not teach. I will get out of the lecture hall. (Keku)

A first-year SwVI also narrated:

Another alternative I normally use to access the course content is by recording what is being taught, though some lecturers refuse to be recorded. They promised

me that they would give me a tape recorder and other devices, so I am still waiting.
(Chiku)

The findings across several studies underscore the significant benefits of audio-based learning materials for SwVI. Research by Fansury, Lutfin, and Arsyad (2019) highlights that audiobooks enhance learning by providing convenient, flexible access to educational content, which aligns with Ozgur & Kiray's (2007) observation that audio course books facilitate independent study for blind students in distance education. Muzata (2013) found that audio-recorded lectures at Kwame Nkrumah University led to improved academic performance and higher satisfaction among SwVI, making them feel more connected to their courses. Additionally, Vaijayanthi (2021) illustrates the diverse range of learning media used by these students, from print and audio to digital formats and assistive technologies. Together, these findings emphasise the importance of integrating varied audio-based resources into educational settings to provide equitable learning opportunities and enhance the overall educational experience for SwVI.

ii. Searching and Reading Online Materials by Using Assistive Software

SwVI were actively engaged with course content through online resources. It was observed that lecturers supplied SwVI with links and references, enabling them to access books, articles, and journals online. Students utilised assistive software to access books and other online materials:

You know, I teach history. Sometimes you may find a book explaining a certain historical scenario in a broad way. Here you can't rely on notes; you should give students a reference so that they will find a book either in hard copy or as an online soft copy. (Shile)

Regarding this theme, SwVI stated:

I normally download books and articles on my laptop or on my phone. The lecturers sometimes give us references so that we download books and articles. My computer and my phone have talk back program and NVDA which guide me in using my phone and computer. These programs speak out. They instruct the use of a computer or a phone with a voice. Through that program, I simply download materials. I also use TalkBack to access the information from the student information system. (Keku)

Although some lecturers and SwVI revealed the usefulness of this approach, other SwVI claimed that it posed a challenge to them because they lacked computer skills, especially in using assistive software. A SwVI noted:

...I do not have computer skills. Searching materials online is difficult for me, so I normally ask my sighted peer to help me when I have an assignment. (Chao)

Another SwVI also reported:

...I normally ask my daughter at home to help me navigate materials from the internet. For individual assignments, they also do the same. I normally take them to stationery so that they can type for me. (Kidako)

The findings reveal a varied experience of SwVI in accessing online course materials. Some students benefit greatly from assistive technologies, finding tools like NVDA an effective, free screen reader particularly useful for navigating digital content, completing assignments, and enhancing reading and writing skills. However, other students struggle due to insufficient

computer skills, highlighting a need for additional support. The presence of accessible resources and adaptable teaching methods by lecturers is commendable, but it underscores the necessity for further aid for those less adept with technology. These observations align with Azzahra, Safitri, and Sujarw (2024), who emphasise NVDA's critical role in the educational experiences of SwVI. NVDA's free access and functionality across various tasks make it a valuable asset. Conversely, Kimogol (2023) identifies multiple barriers that SwVI face, including issues with navigation, tool usability, and compatibility with assistive technologies. These challenges indicate that digital learning materials often lack universal design principles. Supporting this, Dheesha (2020) notes the generally low availability and usability of assistive software, exacerbated by a lack of expertise among educators in using such tools. The findings underscore the significant impact of assistive technologies on the learning experiences of SwVI while also highlighting critical areas for improvement. The benefits of tools like NVDA are clear, but the persistent barriers and lack of adequate support for students struggling with technology suggest that a more inclusive approach to digital learning materials is needed. Addressing these issues could enhance educational accessibility and effectiveness for all students.

5.2.3 Pedagogical Practices Aligned to UDL Principle of Multiple Means of Expression

Data from interviews and observations revealed that lecturers employed various approaches to enable SwVI to express their understanding of course content. The most frequently reported approaches, as highlighted by interview participants and the researcher's observations, included: providing tests and final exams in Braille format, assigning individual projects, conducting oral tests and final exams, as well as incorporating project work and hands-on activities.

i. Writing Final Exams and Tests in Braille Format

During interviews and observations, it was noted that SwVI were participating in the same examinations and tests as their sighted peers, though in Braille format. Lecturers would initially prepare the tests and exams in standard print, and then convert them into Braille using an embosser machine located in a resource room. They would then use Perkins Braille machines and hand frames to write their answers. Once completed, the Braille sheets were sent to hired Braille transcribers to be converted into standard print for marking.

One of the lecturers noted:

In case of assessment work, I always give them the test in Braille format since we have an embosser in our resource room. During the test, I give them extra time to complete their test. During exams, I prepare their exams in Braille format, and they answer them in Braille form using Perkins Braille or Hand frames; then our Braille transcriber transcribes the exams in normal print for marking. (Mwai)

The use of Braille format in the assessment process is a widely recognised practice aimed at enhancing accessibility for SwVI. This approach is well supported by various studies, including Ndume (2019), Kisanga (2019), Lyakurwa (2019), and Rodrick (2021), which highlight its alignment with the Tanzanian education and training policy of 2014. This policy mandates the use of braille throughout different educational levels, promoting inclusivity and fairness in assessments. However, the effectiveness of braille format in assessments is not uniform across all SwVI. Muzata (2021) points out that while braille format can contribute to fairness, it is not universally beneficial. Specifically, students who lack braille skills may find this format less helpful and may rely on oral tests or peer assistance instead. This issue underscores the complexity of accessibility needs and the necessity of providing multiple assessment options. The situation in Tanzania mirrors findings from Kirboyun *et al.* (2024) in Türkiye, where many SwVI also depended on low-tech assistive devices due to limited access to or familiarity with high-tech alternatives. While high-tech solutions like Braille booklets and

advanced assistive devices are available, they may not always be suitable for all students due to unfamiliarity or lack of skills. Additionally, Mgonja and Mwila (2023) highlight the role of special needs teachers in providing tailored support, such as large print notes and customised exam settings. This suggests that a one-size-fits-all approach may not be effective and that individualised support can play a crucial role in addressing diverse needs. This reveals the need for a flexible and individualised approach to assessment, highlighting that not all students benefit equally from the same format or technology, and relying solely on braille or high-tech solutions may overlook those who are less familiar with these tools.

ii. Alternative Assessment through Oral Responses and Assisted Transcription

This approach was utilised for SwVI who had acquired blindness in adulthood. It was identified that two first-year SwVI were unable to utilise the Braille machine and hand frames. Consequently, they relied on assistance from sighted individuals, who served as Braille transcribers and sign language interpreters. This approach was found to be suitable for SwVI who lacked Braille skills as an alternative to typed or Braille assignments:

...For those who don't have Braille skills, I allow the sighted guide to read questions for them. We allow someone to read for them. We have transcribers in the Department of VI, so they sometimes read for them and write the provided answers on the answer sheet. (Mwai)

This finding aligns with the research conducted by Kirboyun *et al.* (2024), which demonstrated that the communication skills of human readers significantly influenced the performance of SwVI in mathematics tests. Similarly, Karabay (2022) found that live reader assistance was as effective as computerised testing and could be used in examinations. Kim (2012) also showed that SwVI performed better with read-aloud accommodations compared to situations without such support. This suggests that read-aloud accommodations may provide a more equitable and accurate assessment of academic achievement for SwVI compared to commonly used accommodations such as braille, large print, and extended time. This approach does not disproportionately benefit students with disabilities who take the same tests. Consequently, educators in higher education institutions should adopt flexible assessment accommodations to ensure fair evaluation procedures for all students, regardless of their learning differences, rather than being rigid and relying on standard approaches that may not be equitable.

iii. Use of Audio-Supported Assessment for Swvi without Braille Literacy Skills

During observation, a researcher witnessed the implementation of this approach, wherein SwVI were taking their exams in a separate venue. The two students who lacked Braille skills were accompanied by their sighted assistants, who read the exam questions aloud to them. This method served as an alternative for SwVI who lacked Braille skills. In this process, examination papers were provided in standard print, and SwVI were paired with a sighted assistant to read the questions aloud while they recorded their answers using tape recorders.

The findings emphasise a growing recognition of the need for adaptive assessment methods that cater to SwVI. This aligns with the principles of UDL, which advocates for modifying educational practices to accommodate diverse learning needs rather than perceiving disabilities as individual deficits (Rose & Meyer, 2002). The Tanzanian Disability Act of 2010 further reinforces this approach by mandating the consideration of special needs in admissions processes (URT, 2010). This legislative framework suggests a commitment to inclusivity and equitable access within educational institutions. The recommended practices for assessment, such as using tape recorders to transcribe answers (Muzata, 2021) or employing read-aloud tests and computerised tests with read-aloud features (Kim, 2012; Karabay, 2022), represent practical adaptations to enhance accessibility and fairness. These methods align with the principle of Multiple Means of Expression, which allows students to

demonstrate their knowledge in varied ways that suit their individual needs. However, the implementation of these adaptive methods is not without challenges.

Kisanga (2019) identified several barriers to effective examination access in Tanzania, including issues with format, administration, feedback, and grading. Similarly, Attia et al. (2023) highlighted the difficulties faced by teachers in Ghana due to a lack of expertise in alternative assessment methods. In Nigeria, Eke and Idika (2017) found that while specialist teachers had the knowledge required for inclusive assessment, their application of this knowledge was often limited. This underscores the promise of adaptive assessment methods in improving educational equity for SwVI, aligning with UDL principles and legislative mandates. The use of tools like tape recorders, read-aloud tests, and computerised assessments can significantly enhance accessibility and fairness. However, the persistent challenges ranging from inadequate formats and procedures to insufficient teacher training highlight the need for a more comprehensive approach to implementation. Educators need to be equipped with both the knowledge and skills to effectively use these tools and adapt their practices to meet the diverse needs of visually impaired students.

6.0 CONCLUSION

The study highlights a notable disparity in the understanding and application of UDL among university staff. While some university staff demonstrated a solid grasp of UDL principles and successfully integrated them into their teaching practices, employing strategies such as providing digital handouts, recorded notes, multimedia resources, and alternative assessments, others exhibited limited understanding or divergent interpretations of UDL. This variation in comprehension reflects the need for a more uniform and comprehensive approach to UDL training for faculty. Based on the study findings, higher education institutions should invest in continuous professional development programmes on UDL and inclusive pedagogy for all university staff. Such training should focus on strengthening staff understanding and practical application of UDL principles, enabling them to adopt diverse instructional and flexible assessment methods that promote equitable learning opportunities for students with visual impairments and other learners with diverse educational needs.

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