



Teachers' Perceptions of the Application of Universal Design for Learning in Accommodating Learners with Visual Impairments in Public Inclusive Secondary Schools of Mwanza City-Tanzania

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Abstract: Universal Design for Learning (UDL) is an educational framework for promoting inclusive education through its three core principles: multiple means of representation, engagement, and action, which emphasize flexible teaching and assessment practices to accommodate students' diverse educational needs. This study examined teachers' perceptions and implementation of Universal Design for Learning (UDL) for learners with visual impairments in inclusive public secondary schools in Mwanza City, Tanzania. Using a qualitative case study design, data were collected from 10 secondary school teachers through interviews, and analysed thematically. Findings show that teachers generally view UDL positively, but mainly understand it as mbinu mseto (mixed teaching methods) rather than a structured framework. UDL was perceived as a way of reducing learning barriers and improving participation. However, implementation was largely informal and constrained by limited resources, inadequate training, heavy workloads, and reliance on special education teachers. The study concludes that UDL practices are emerging but not yet fully institutionalized. It recommends strengthened teacher training, improved availability of assistive technologies, and policy support to ensure consistent implementation in inclusive classrooms.

Keywords: Universal Design for Learning (UDL), Learners, Teachers' perceptions, Visual impairments; Inclusive education

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1. Introduction

In recent decades, international and national efforts have increasingly emphasized inclusive education as a fundamental human right. The Salamanca Framework for action (1994) for example recognizes the inclusion and participation as essential to human dignity and to the enjoyment and exercise of human right. It further puts clear that fundamental principal of the inclusive school

is that all children should learn together, wherever possible, regardless of any difficulties or differences they may have. This assertion instructs the schools to recognize and respond to the diverse needs of their students accommodating both different styles and rates of learning and ensuring quality education to all, through appropriate curricula, organizational arrangements, teaching strategies and resources. In addition, Convention on the Rights of Persons with Disabilities CRPD (2006) require the member countries to recognize the right of persons with disabilities to education. It

further mandates that, persons with disabilities should access an inclusive, quality and free primary and secondary education on an equal basis with others in the communities in which they live (Possi & Milinga, 2017). Similarly, Sustainable Development Goal 4 emphasizes on ensuring inclusive and equitable quality education and promotes lifelong learning opportunities for all (UN, 2016). This means that guaranteeing access to quality education to all population in the community is one of the practical means and efforts to eliminate poverty in the world by 2030. As a result, member states are expected to develop inclusive policies, supportive infrastructure, and enabling learning environments to ensure effective implementation of inclusive education.

In Tanzania, the commitment to inclusive education has been strengthened through the adoption of international frameworks such as the Salamanca Framework for action (1994) which requires education systems to accommodate learners regardless of their physical, intellectual, social, emotional, or linguistic differences (Possi & Milinga, 2017). This commitment is further reinforced by the Dakar Framework for Action (2000), which promotes universal access to free and quality basic education for all children. At the national level, policy instruments such as the Disability Act (2010) and the Education and Training Policy (2014) provide a legal foundation for ensuring equal access to education in inclusive settings (URT, 2015). These policy developments have contributed to increased enrolment of learners with diverse educational needs, including learners with visual impairments, in mainstream schools.

Evidence indicates a steady increase in the enrolment of learners with disabilities in Tanzanian schools. For instance, between 2009 and 2017, approximately 10,020 learners with visual impairments were enrolled in primary schools (MoEVT, 2023; URT, 2018). More recent regional statistics from the President's Office – Regional Administration and Local Government (PORALG, 2023) show that in 2023, there were 386 students with total blindness and 6,011 students with low vision enrolled in secondary schools across the country, bringing the total number of learners with visual impairments to 6,397. This trend reflects a growing diversity of learners within mainstream educational settings.

The increasing enrolment of learners with disabilities has created a demand for appropriate pedagogical approaches, instructional resources, and adaptive teaching strategies. Conventional teaching methods used in traditional classrooms are currently inadequate in addressing the diverse needs present in inclusive classrooms (Losioki & Ngowoko, 2024; Cappiali, 2023). As a result, teachers are required to employ flexible and differentiated instructional strategies that can effectively support all learners, including those with visual impairments, within inclusive learning environments.

In response to this, various theoretical and practical frameworks have been developed to guide inclusive teaching practices. Among these, the Universal Design for Learning (UDL) framework has gained significant attention. The Universal Design for Learning is grounded in the principle of designing learning environments that are accessible and effective for all learners. Developed in the 1990s by researchers at the Center for Applied Special Technology (CAST), UDL promotes proactive curriculum design that anticipates learner variability rather than reacting to it after barriers emerge. It emphasizes flexibility in instructional goals, methods, materials, and assessment practices to minimize barriers and enhance participation for all students, including those with disabilities (CAST, 2011; Rose et al., 2006). UDL is widely recognized as a comprehensive framework that promotes inclusive and equitable learning by offering multiple means of engagement, representation, and expression. It is designed to accommodate learners across differences in ability, age, gender, cultural background, and language. By providing structured guidelines for curriculum design, UDL enables educators to create learning environments that respond to learner diversity. Ndereya (2016) describes UDL as a framework for fostering active learning environments that accommodate individual differences. Similarly, Smith (2017) emphasizes its role in addressing limitations within traditional curriculum structures, while Boothe and Lohmann (2018) highlight its influence on instructional design and assessment practices. Recent studies emphasize the importance of UDL in strengthening inclusive education systems, particularly in secondary schools where learner diversity is more pronounced. The International Disability Alliance (2021) underscores that UDL plays a critical role in reducing barriers to learning by promoting flexible instructional approaches and supporting equitable participation for all learners. The growing recognition of UDL as a framework for addressing learner diversity has implications for inclusive education systems worldwide. By promoting flexible curriculum design and reducing barriers to learning, UDL offers a practical approach for supporting learners with diverse educational needs, including those with disabilities. However, despite the potential of UDL to enhance inclusive educational practices, evidence from many developing countries, including Tanzania, suggests that challenges persist in ensuring equitable learning opportunities for all learners especially those with diverse learning needs (Seliane & Kgothule, 2022; Larios & Zetlin, 2023; Manase, et al 2024, Ajani & Ntombela, 2025)

In Tanzania for example, despite commitment to inclusive education, studies indicate that learners with visual impairments continue to face barriers in inclusive secondary school settings. Studies have reported the persistent use of inflexible teaching methods, inadequate provision of accessible learning materials, and limited curriculum adaptations to accommodate diverse learning

needs (Kisanga & Richards, 2018; Losioki & Ngowoko, 2024; Muzata, 2021, Karoli, 2024). Furthermore, many teachers lack specialized training and professional competence in managing inclusive classrooms, which may contribute to the continued reliance on traditional instructional approaches that inadequately address learner variability (Samwel, 2023; Mussa, 2025). Chiwandire (2020) found that lecturers in higher learning institutions often struggled to effectively support students with visual impairments due to insufficient training and knowledge, while Mallillin (2017) observed that educators without special education training frequently feel unprepared to implement inclusive practices. Consequently, learners with visual impairments continue to experience challenges in accessing instructional content, participating fully in classroom activities, and demonstrating their learning through appropriate assessment methods. These challenges raise concerns about the extent to which inclusive education policies are being effectively translated into classroom practices that promote equitable learning opportunities for all students.

Although Universal Design for Learning (UDL) has been widely recognized as a promising framework for addressing learner diversity through flexible teaching strategies, multiple means of representation, engagement, and expression, evidence regarding its perceptions and implementation in Tanzanian inclusive secondary schools remains limited. Existing studies have primarily focused on challenges facing learners with special educational needs and teacher preparedness for inclusive education with little attention given to teachers' perception of UDL principles. Consequently, little is known about how teachers in inclusive public secondary schools perceive Universal Design for Learning. Revealing teachers' perception of UDL is essential for inclusive practices as their way of thinking about UDL can shape its practical implementation. This study addressed the existing knowledge gap by investigating teachers' perceptions of UDL principles in inclusive secondary schools of Mwanza city Tanzania.

The study was therefore guided by two research questions:

1. How do teachers in inclusive public secondary schools construct the concept of the UDL and its principles?
2. What challenges do secondary school teachers perceive in implementing UDL principles for students with visual impairments?

2. Literature Review

Universal Design for Learning (UDL), developed by the Centre for Applied Special Technology (CAST), is a proactive instructional framework that emphasizes the design of flexible curricula to address learner variability from the outset rather than providing individual

accommodations after barriers emerge. It promotes multiple means of engagement, representation, and expression to enhance access, participation, and achievement for diverse learners, including students with disabilities (CAST, 2011; Rose et al., 2006). Although widely recognized as a powerful framework for inclusive education, UDL remains a relatively new concept for many educational stakeholders, and its implementation continues to vary across contexts.

Research has shown generally positive perceptions of UDL among teachers and students. For example, Han and Lei (2024) conducted a scoping review in China and found that teachers and students generally held favourable views of UDL, perceiving it as supportive of inclusive learning. However, the study also identified barriers such as misconceptions about UDL, rigid curricula, and insufficient professional training. Similarly, Krishan and Sharma (2023) reported that while special education teachers in India demonstrated slightly higher awareness of UDL, both general and special education teachers lacked comprehensive understanding of its principles. These findings suggest that awareness alone is insufficient without structured professional support and whole-school implementation strategies.

In European contexts, Markou and Díaz-Noguera (2022) explored teachers' readiness to implement UDL in Greece and found that limited access to technology, outdated curricula, and lack of training hindered effective implementation. Special education teachers reported fewer difficulties compared to general education teachers, highlighting disparities in preparedness. Likewise, Capp (2020) in Australia found that teachers' confidence in applying UDL varied across its principles, with lower confidence in more complex instructional dimensions. Alquraini and Rao (2020) in Saudi Arabia further emphasized the need for training, time, resources, and supportive policies for effective UDL implementation. These studies collectively highlight that while teachers generally recognize the value of UDL, systemic and institutional constraints often limit its practical application.

Studies conducted in North America and Europe also show similar patterns. Chen et al. (2023) found that secondary school teachers in Australia held positive attitudes toward UDL, although they expressed concerns about rigid instructional practices. Westine et al. (2019) reported that university faculty in the United States demonstrated moderate familiarity with UDL guidelines, with uneven implementation across different instructional dimensions. Similarly, Mavrovic-Glaser (2017) found that only slightly over half of university teachers in Chicago were familiar with or regularly used UDL strategies, despite engaging in practices aligned with its principles. These findings suggest that UDL implementation is often partial and sometimes unintentional, reflecting gaps between theoretical knowledge and classroom practice.

In addition, studies focusing on pre-service teachers indicate positive attitudes but limited practical readiness. Barahona et al. (2023) found that Chilean pre-service teachers valued inclusion and demonstrated willingness to apply UDL, although they experienced challenges such as anxiety and uncertainty in practice. Lanterman and Applequist (2018) similarly reported that teacher candidates were enthusiastic about UDL but required more structured preparation to implement it effectively. These findings emphasize the importance of embedding UDL training in teacher education programs.

In the African and Tanzanian context, research remains limited but revealing. Mwakyeja (2013) found that teachers in southern Tanzania had limited knowledge of inclusive education and struggled to adapt instruction for learners with visual impairments, highlighting persistent capacity gaps. More recently, Lyakurwa (2019) found that although inclusive practices existed in Tanzanian higher education institutions, UDL was not explicitly recognized or systematically applied, and students with visual impairments still required additional support. These findings suggest that while inclusive education policies exist, implementation remains weak and UDL is not yet widely integrated into classroom practice.

In school leadership contexts, Yazıcıoğlu (2021) found that school principals in Turkey generally supported inclusive education but faced challenges such as inadequate teacher preparation, limited resources, and weak infrastructure. Similarly, Alzahrani (2022) reported that university faculty in Saudi Arabia perceived themselves as knowledgeable about UDL and were willing to apply it, although contextual factors influenced implementation. Dempsey et al. (2023) in Ireland also found mixed awareness among educators, with many unintentionally applying UDL principles without formal recognition.

3. Methodology

A qualitative approach with a case study design was employed to facilitate an in-depth understanding of teachers' perceptions of universal design for learning practices for learners with visual impairments in public secondary schools in Mwanza city. 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 public secondary schools in Mwanza city 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 10 subject teachers from two selected inclusive public secondary schools of Mwanza City, Tanzania. The study employed semi-structured interviews using interview guides that outlined key topics related to the teachers' perceptions of UDL principles and practices (Creswell, 2014). The generated data were thematically analysed following the six-step process outlined by Braun and Clarke (Braun & Clarke, 2012) to derive meaningful insights from the participants' responses. To ensure trustworthiness, the study adhered to the principles of transferability, credibility, dependability, and confirmability throughout the research process. The ethical standards were ensured through provision of informed consent, confidentiality, anonymity, and voluntary participation. Ethical clearance was obtained from the University of Zambia Research Ethics Committee (Approval No. HSSREC IRB 0005376). In Tanzania, permission to conduct the study was granted by the City Council Executive Director (CED) through written authorization (Permit No. HB.252/294/013/10 which allowed access to the selected inclusive secondary schools for data collection. The following section presents the study findings.

4. Results and Discussion

4.1 How do teachers in inclusive secondary schools construct the concept of UDL?

The findings provide an in-depth understanding of how teachers construct and interpret UDL within classroom practice, particularly in relation to learners with visual impairments. The analysis reveals that teachers' perceptions are shaped by both positive recognition of UDL as an inclusive approach and practical constraints affecting its implementation. The section is organized into interrelated themes, including teachers' understanding of UDL as *mbinu mseto*, its role in removing learning barriers, its contribution to participation and inclusion.

4.1.1 UDL as "Mbinu Mseto" for Inclusivity

The findings reveal that teachers commonly understand UDL as a flexible teaching approach, locally interpreted as *mbinu mseto* in Kiswahili (mixed or multiple teaching methods). This indicates that teachers associate UDL primarily with the use of varied instructional strategies rather than a structured pedagogical framework.

I know it as a framework that is used to accommodate the needs of all students in the classroom by using

different approaches in teaching, learning and assessment. In my understanding, I think it is what we call *mbinu mseto*, where a teacher does not rely on only one method of teaching. Instead, the teacher employs more than one method in presenting the content so that students can understand in different ways. For example, a teacher may explain verbally, write on the board, ask questions, or use teaching aids depending on the topic and learners in the class. (T1MSS, April 2026)

Another participant added;

From what I understand, UDL is about using different teaching strategies in the classroom. You cannot just use one method like lecturing. You have to mix approaches such as explanation, discussion, and sometimes practical examples so that all learners, including those with visual impairments, can follow the lesson. (T4BSS April 2026)

Another teacher also insisted:

In simple terms, UDL means teaching in different ways. It is about not depending only on writing on the board, but also explaining, asking questions, and sometimes using other ways like oral communication or group discussion so that students can understand better. (T5MSS, April 2026)

The findings indicate that teachers conceptualize UDL primarily as a multi-method teaching approach (*mbinu mseto*) rather than a structured instructional framework grounded in its formal principles (multiple means of representation, engagement, and expression). This suggests that teachers' understanding of UDL is largely simplified and practice-based, focusing on observable classroom strategies rather than theoretical constructs highlighting a partial but positive understanding of UDL, where teachers recognize the importance of varied teaching approaches but lack full awareness of its theoretical and strategic framework. This finding aligns with Han and Lei (2024), who observed that teachers often hold positive but simplified understandings of UDL, frequently equating it with differentiated instruction rather than a structured framework. Similarly, Krishan and Sharma (2023) found that teachers' awareness of UDL does not necessarily translate into deep conceptual understanding, as many lack familiarity with its three core principles. Teachers' conceptualization of UDL as *mbinu mseto* indicates an emerging but incomplete pedagogical understanding, where inclusivity is equated with method variation rather than intentional instructional design guided by UDL principles. However, this understanding shows that teachers were to some extent concerned with the students' diverse needs and they were ready to support them by using multiple teaching methods. This indicates that while teachers are already practicing elements of UDL,

the absence of formal conceptual grounding limits intentional and systematic implementation.

4.2.2 UDL as a Mechanism for Removing Learning Barriers

Findings from the study indicate that teachers perceive UDL not only as a flexible instructional approach, but also as an important mechanism for removing barriers to learning faced by students with visual impairments. Participants emphasized that traditional teaching methods often create learning obstacles, particularly when instruction relies heavily on visual presentation. In contrast, UDL is viewed as an inclusive approach that reduces these barriers by providing alternative ways of accessing content, participating in learning, and demonstrating understanding.

The UDL removes obstacles and learning barriers that are resulted from students' impairment. By using the approaches which align with principles of UDL, students with visual impairment become active members in the learning process (T1BSS, personal communication, April 2026).

When we use different methods of teaching, students with visual impairment are no longer left behind because they can access the lesson in another way instead of only relying on what is written on the board (T4MSS, personal communication, April 2026).

I think UDL helps to reduce difficulties that learners face, especially those who cannot see. It allows them to understand through listening and explanation rather than only reading or writing (T5BSS, personal communication, April 2026).

The findings suggest that teachers perceive UDL as a practical solution for eliminating learning barriers experienced by students with visual impairments in mainstream classrooms. The dominant understanding is that barriers are mainly caused by instructional methods that rely heavily on visual presentation, such as writing on the board, diagrams, and textbooks without adaptations.

Teachers therefore view UDL as a strategy that introduces alternative pathways of learning, especially through verbal explanation, discussion, tactile materials, and flexible assessment methods. This shift enables learners with visual impairments to participate more actively and meaningfully in classroom activities. This understanding is consistent with CAST (2011), which defines UDL as a proactive approach to removing barriers from the outset of instruction. Rose et al. (2006) similarly emphasize that UDL is designed to anticipate learner variability and minimize the need for retroactive accommodations. In agreement, Ferguson et al. (2019) found that in many African classrooms, reliance on traditional instruction creates exclusionary learning

environments, especially for learners with disabilities. The current study supports this argument by showing that teachers recognize the need for alternative instructional formats to address visual impairment-related barriers.

However, the findings also suggest that teachers primarily locate barriers at the level of instructional delivery rather than within broader curriculum design or institutional structures. This limits the depth of UDL understanding, as barriers are seen as method-related rather than system-wide. This underscores that teachers recognize the practical value of UDL in reducing immediate classroom barriers, but lack a systemic perspective of inclusive curriculum design. The educational stakeholders need to broaden teachers' understanding of barriers beyond instructional methods to include curriculum, assessment, and institutional structures in order to fully realize UDL's preventive potential.

4.2.3 UDL as a Bridge to Participation and Inclusion

Participants described UDL as an effective approach for enhancing participation and inclusion of learners with visual impairments. The theme indicates that the use of multiple means of representation, engagement, and expression enables learners with visual impairments to move from passive reception to active participation. Participants further noted that reducing learning barriers improves learners' confidence, interaction, and classroom involvement.

T2MSS emphasized that UDL promotes engagement through varied instructional approaches:

UDL is a teaching framework that encourages teachers to use different ways when teaching so that all students, including those with disabilities, can learn effectively. It involves presenting content in different ways, allowing students to express learning differently, and engaging them in various activities. For learners with visual impairments, oral explanations and tactile materials are helpful. Using different approaches makes students more active and confident in class discussions (T2MSS, personal communication, April 2026).

Similarly, T3BSS highlighted inclusion through participatory teaching strategies:

Multiple means of representation means presenting information in different ways such as verbal explanation, tactile diagrams, and Braille materials. I ensure learners with visual impairments participate in discussions and group work and are given equal opportunities to respond. Using different methods like discussion and explanation increases students' participation and understanding, making them feel included and motivated (T3BSS, personal communication, April 2026).

Participant T4MSS further connected inclusion with removal of barriers and classroom participation:

UDL is a kind of learning model which is designed to accommodate all learners in a class, including students with disabilities. It includes using different ways of presenting course content and involving students in learning activities. When used properly, every learner in a classroom can benefit from what is taught. It makes students with visual impairment feel included because they are not excluded by visual materials like the board or diagrams. So, in that way, UDL helps to reduce barriers and allows them to participate more in classroom activities (T4MSS, personal communication, April 2026).

The findings demonstrate that UDL functions as a bridge to participation and inclusion by ensuring that learners with visual impairments access content through multiple formats, engage actively in classroom interaction, and express their understanding in flexible ways. This inclusive approach enhances learners' confidence and classroom presence, thereby transforming them from passive recipients into active contributors in the learning process, suggesting that multimodal instruction improves access to content and fosters active participation among learners with visual impairments. This aligns with CAST (2011), which identifies engagement as a central principle of UDL. Phelan et al. (2025) similarly found that UDL enhances student participation by providing multiple ways of interacting with learning content. Wang and Liu (2024) also highlight that multimodal instruction promotes accessibility and learner engagement. However, participation is largely understood at the classroom interaction level rather than broader educational participation, such as independent learning or equitable assessment access. This implies that UDL is valued as an inclusive engagement strategy, but its transformative potential is not fully realized in terms of empowering learner autonomy and equity across all learning domains.

4.3 What challenges do secondary school teachers perceive in implementing UDL principles for students with visual impairments (SwVI)?

4.3.1 UDL as Time-Consuming and a Burden in Practice

Although participants acknowledged the pedagogical value of UDL in promoting inclusive education, they further expressed concerns that its practical implementation requires extensive preparation time, additional teaching resources, and constant adaptation of instructional strategies. These demands are difficult to meet within the existing school conditions characterized by heavy teaching loads, limited staffing, and pressure to complete the syllabus within a fixed timeframe. Participants emphasized that time limitations

significantly hinder their ability to design UDL-informed lessons. Teachers reported that the expectation to teach many classes per week reduces opportunities for careful planning of inclusive lessons that incorporate multiple means of representation, engagement, and expression.

One participant described this challenge in detail:

Planning a lesson in UDL principles needs time, something which is difficult for most teachers. I have 24 classes per week. All this limits time for preparation. Apart from that, I also have other responsibilities outside teaching such as being a teacher on duty and being a discipline master. All this limits time for preparation. Planning a lesson in UDL principles needs time, something which is difficult for most teachers. Another challenge is that sometimes we rush when teaching so that we cover the syllabus on time. You know that quality assurance officers and other educational officers normally insist that we cover the topic on time. So sometimes we rush to adhere to this guideline (T1 ISA, personal communication, April 2026).

Similarly, another participant noted the pressure of time and workload:

Honestly, I am not very familiar with UDL as a concept. Most of the time, we just prepare quickly so that we can go and teach. Also, there is pressure to cover the syllabus on time, so sometimes we are forced to rush through the content. When you are rushing, it becomes difficult to stop and think about how to adapt the lesson for different learners, especially those with visual impairments. So, I think the main challenges are lack of training and time pressure (T5 ISA, personal communication, April 2026).

This further illustrates that under time pressure, teachers prioritize syllabus coverage over instructional differentiation, which limits systematic application of UDL principles. This response highlights that UDL is often perceived as an “additional task” rather than an integrated teaching approach, particularly in contexts where teachers are already overloaded with both teaching and administrative responsibilities. This finding is consistent with Alquraini and Rao (2020), who identified time constraints and workload as major barriers to UDL implementation. Markou and Díaz-Noguera (2022) also found that rigid curricula and limited preparation time hinder teachers’ ability to implement UDL effectively. In Tanzania, Juma (2025) similarly reported that lack of time and institutional support negatively affects inclusive instructional practices. The current study reinforces these findings and adds that teachers often prioritize syllabus coverage over instructional adaptation, leading to shallow engagement with UDL principles. This suggests that UDL is perceived not as an integrated pedagogical philosophy but as an additional workload demand, particularly in resource-constrained environments. UDL

is experienced as an externally imposed instructional burden rather than an embedded pedagogical approach, primarily due to structural constraints such as workload pressure and curriculum rigidity.

4.3.2 UDL as a Responsibility Concentrated on Special Education Teachers

Apart from the concerns related to time constraints, the implementation of UDL is disproportionately positioned as the responsibility of special education teachers rather than being embraced as a collective pedagogical responsibility among all teachers. This suggests a structural imbalance in the distribution of inclusive education practices within schools, where specialized staff are relied upon to address instructional and assessment adaptations for learners with visual impairments.

One participant highlighted this reliance on a limited number of trained personnel, particularly in relation to Braille literacy and examination adaptation processes:

Also, we have few teachers who can read and write Braille. So we normally ask the two teachers to help us. For tests and examinations, I usually prepare them in printed form, then I take them to the resource where we change them into Braille format. After doing their exams, their scripts are taken to special education teachers for transcription before marking (T1 ISA, personal communication, April 2026).

This illustrates how essential inclusive practices, such as Braille transcription and examination modification, are centralized within a small group of specialists. Rather than being embedded across the teaching workforce, these responsibilities are delegated to specific individuals, thereby reinforcing a dependency model. The process also indicates a complex workflow that begins with classroom teachers but ultimately requires special education expertise for translation, adaptation, and assessment. The findings show that UDL-related responsibilities are largely concentrated among special education teachers, particularly in tasks such as Braille transcription, exam adaptation, and assistive technology support. General education teachers often rely on these specialists for implementing inclusive practices.

Similarly, another participant emphasized the persistent skills gap among mainstream teachers in the use of assistive technologies and inclusive instructional tools:

We also face a lack of skills in using some of the assistive devices and technologies. Sometimes we depend on special education teachers or peer support, which is not always sufficient (T4 ISA, personal communication, April 2026).

This statement further underscores the systemic reliance on special education personnel as the primary agents of inclusion. The dependence on a limited pool of expertise not only places additional pressure on these teachers but also limits the sustainability and consistency of inclusive practices when support is unavailable or insufficient. These findings indicate that UDL implementation is often concentrated within specialized roles, rather than being institutionalized as a shared responsibility among all teachers. This uneven distribution may contribute to workload intensification among special education teachers and may lead to implementation fatigue. This aligns with Mwakyjeja (2013), who reported that inclusive education in Tanzania often depends heavily on a small group of trained teachers. Similarly, Lyakurwa (2019) found that inclusive practices are not widely distributed among all teachers, leading to unequal responsibility sharing. Alzahrani (2022) and Yazıcıoğlu (2021) also highlight that insufficient teacher training leads to over-reliance on specialists in inclusive education systems. The current study, however, further reveals that this reliance creates systemic dependency, which may hinder sustainability and reduce the ownership of inclusive practices among general teachers. UDL implementation is structurally centralized within special education roles rather than institutionalized across the teaching workforce, resulting in uneven responsibility distribution and limited whole-school inclusion.

4.2.6 UDL is limited by the insufficient availability of up-to-date assistive technologies and instructional resources

Participants reported that the implementation of UDL is limited by inadequate availability of updated assistive technologies and teaching resources. Although some tools exist in schools, they are insufficient, inconsistent, or not fully functional, limiting teachers' ability to apply multiple means of representation, engagement, and expression effectively. Teachers emphasized that the shortage of assistive devices such as Braille materials, tactile resources, and functional technology restricts inclusive teaching practices. In some cases, available equipment is not operational or is available in very limited quantities, forcing teachers to rely heavily on verbal instruction.

One participant explained:

Another challenge is lack of technology and digitalized library which could help our students in private studies. I do not have technology which can help me to present numbers, diagrams, pictorial materials content and numbers. Lack of material and technology is a great challenge for me (T1 ISA, personal communication, April 2026).

Similarly, another teacher highlighted the limited availability and functionality of assistive tools:

We do have some assistive tools, but they are limited and not sufficient. There are Braille materials in some cases, and also devices like Orbit Readers, but not all students can access them at the same time (T5 ISA, personal communication, April 2026).

Furthermore, participants noted that even when assistive technologies are available, they are not always usable due to technical challenges or lack of training:

Although the school has some tools like Braille materials, Orbit Readers, and sometimes tactile diagrams, they are not enough for all students and all topics. In some cases, the equipment is also not functioning properly or is not available when needed (T3 ISA, personal communication, April 2026).

The findings indicate that teachers perceive the shortage of assistive technologies and instructional resources as a major constraint to the effective implementation of UDL. Participants expressed concerns about the limited availability of Braille materials, tactile resources, and functional digital technologies, which they believed restricted their ability to provide multiple means of representation for learners with visual impairments. Such experiences appear to reinforce the belief that effective UDL implementation is difficult to achieve in the absence of adequate instructional resources. This perception is consistent with the findings of Markou and Díaz-Noguera (2022) and Wang and Liu (2024), who identified inadequate technological infrastructure as a significant challenge to UDL implementation. Similarly, studies conducted in Tanzania by Kisanga (2019) and William (2023) reported that shortages of assistive devices and learning materials continue to undermine inclusive educational practices. These perceptions suggest that teachers view assistive technologies and instructional resources as essential enablers of UDL rather than supplementary teaching tools. Their concerns reflect a belief that the successful implementation of inclusive pedagogies depends not only on teacher competence and commitment but also on the availability of appropriate educational resources. This implies that efforts to strengthen UDL implementation should extend beyond teacher training to include sustained investment in assistive technologies, accessible learning materials, and resource maintenance systems. Addressing these concerns may enhance teachers' confidence in implementing UDL and increase the likelihood of consistent and effective inclusive classroom practices.

5. Conclusion and Recommendations

5.1 Conclusion

This study examined teachers' perceptions and implementation of UDL for learners with visual impairments in inclusive secondary schools in Mwanza City, Tanzania. The findings indicate that while teachers hold positive views toward inclusive education, their understanding and application of UDL remain partial and largely practice-oriented. UDL is commonly understood as *mbinu mseto* (mixed teaching methods), reflecting an emphasis on varied instructional strategies rather than a structured framework based on its three core principles. Although teachers recognize its potential to reduce learning barriers and enhance participation, this understanding is largely confined to classroom-level adjustments rather than a comprehensive approach to curriculum design, assessment, and institutional inclusivity. The study concludes that UDL is perceived as beneficial in supporting learners with visual impairments through multiple means of representation, engagement, and expression. However, its implementation is constrained by heavy workloads and time limitations, the perception that it is primarily the responsibility of special education teachers, and limited availability of assistive technologies and instructional resources. Overall, while elements of UDL are evident in classroom practice, its full and systematic implementation remains limited, indicating that it is not yet fully institutionalized as an integrated pedagogical framework in inclusive secondary schools.

5.2 Recommendations

It is recommended that

1. Professional development programs be strengthened to deepen teachers' understanding of UDL beyond intuitive practice and ensure alignment with its formal theoretical principles.
2. Furthermore, school-level and policy frameworks should be reinforced to institutionalize UDL through systematic planning, adequate time allocation that bridge the gap between teachers' positive perceptions and effective classroom practice.

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