14 A Shelter of Love
Assistive Technologies for Education amongst Students with Learning Disabilities in Uganda

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14.1 INTRODUCTION: BACKGROUND TO ASSISTIVE TECHNOLOGY AND DISABILITY

The global need for Assistive Technology (AT) is high. The Global Report on AT jointly published by the World Health Organization [1] and United Nations Children's Fund (UNICEF) estimated 2.5 billion people in need of assistive products in 2019. In 2022, the report acknowledged that 1 in 10 people in the world need assistive products [2]. By 2050, it is estimated that 3.5 billion people will require assistive products [2]. However, as of 2016, about 90% of those who required ATs did not access them [3]. The reality therefore is that most of us – globally – will require AT at some point in our lifespan. With this in mind, considering the acknowledgement that access to AT is a right and a means to access, and realize other rights [4], it is critical to note that as a field, we rarely discuss issues related to Learning Disabilities (LD) when it comes to AT usage and provision [5]. Researchers have noted that there is still an enormous gap between the potential of AT and how much it actually helps [6]. While studies demonstrate the ideal approaches for developing AT policy [7], we are less inclined to discuss the policy gaps for improvement, AT products used, and their impact on students with neurodisability in Uganda [8]. With limited studies in place to address this literature and AT for the education gap, this study explored the experiences of university students with Learning Disability on AT for education in Uganda. It also explored how access to AT can be improved in Uganda by interrogating different government initiatives and their gaps. This was in lieu of not only the complex learning needs they face, but also the difficulties they encounter in acquiring new skills in inclusive university education with traditional pedagogies.

14.1.1 Defining Assistive Technologies (AT)

AT refers to the development and application of organized knowledge, skills, procedures, and policies relevant to the provision, use, and assessment of Assistive

 DOI: 10.1201/9781032664828-17

Products (AP) [9]. In consonance with the global report, AT is an umbrella term for AP and its related systems and services [2]. APs include devices, equipment, instruments, and software that are specifically designed and produced to maintain and/or improve functioning [9]. ATs are thus assistive and rehabilitative devices, objects or systems that are utilized to help disabled people [10] and mitigate the effects of disabilities [11,12]. They are tools for communication, social interaction and physical access to resources [13]. In Uganda, Persons with Disabilities Act, 2019 [14] uses the word AT and assistive devices interchangeably to mean equipment or devices that support persons with disabilities to participate effectively in all aspects of life. The selection of AT, along with appropriate services and supports, is of vital importance to ensure that students not only learn and communicate with peers and parents but also are welcomed as part of a mainstream classroom, with similar expectations and considerations as their peers. While some universities and parents embrace AT to support students with disabilities, others are yet to see how the technology enhances inclusive education for these students specifically for this study of LDs.

14.1.2 Defining Learning Disability

LD is a group of neurodevelopmental disorders that can significantly hamper a person's ability to learn new things [15]. Examples include some of the common types of LDs espoused by Sanjana [16] as individuals having dysgraphia (difficulty producing legible handwriting), dyscalculia (difficulty understanding and using math concepts and symbols), dyspraxia (difficulty in language comprehension and does not match language production. She/he may mix up words and sentences while talking), nonverbal learning disorder (demonstrated by below-average motor coordination, visual-spatial organization and social skills), and dyslexia (may mix up letters within words and words within sentences while reading. May also have difficulty spelling words correctly while writing and letter reversals are common. Some individuals with dyslexia may also have a difficult time with navigating and route finding using right/left and/or compass directions). The LDs can, however, be bypassed through the application of ATs. Such individuals confine significant cognitive and adaptive behavioural impairment and are prone to experiencing traumatic grief symptoms such as difficulty or inability to find meaning and communication barriers [17]. The LDs also represent some of the personal difficulties students face in university classroom environments.

14.2 CONTEXT

As part of the COVID-19 lockdown regulations, all institutions across Uganda were required to shift to Open Distance and eLearning (ODeL). Before an institution was cleared to offer remote teaching and learning, they needed to show that they adhered to guidelines that were issued in July 2020 by the National Council for Higher Education (NCHE). One of the requirements was an interactive learning management system (LMS) that effectively supports eLearning, which should provide for student-to-student interactions, student and instructor interactions, and evaluation of interaction. After the lockdowns, institutions were required to continue in a blended learning mode. However, institutions were not required to ensure that all physical and remote learning activities, and in particular the LMS and its content,

were accessible to students with disabilities, even though 12.4% of the population have a disability [18]. The situation for students with LD is even worse because they are a neglected group regarding AT.

In Uganda, the Ministry of Health [19] clearly indicated that the government has limited awareness of the need for and importance of AT, lacks enforceable guidelines, lacks mainstream AT schemes. There is no national strategy for AT, the government plays no or very limited role in ensuring availability and access to ATs, its contribution is ad-hoc, and there is no monitoring and evaluation plan and indicators of AT impacts. The usage of AT data in Uganda is not available attributed to lack of a central place for registration, distribution of AT, low coordination and lack of contemporary information management systems which highly contributes to insufficient data collection, and lack of money to finance ATs. The Uganda Functional Difficulties Survey (UFDS) 2017 [20] indicated that over 62% of persons with disabilities who needed AT did not have such devices. Moreover, data of the number of disabled students with LD enrolled in universities in Uganda are not readily available [21]. Albeit the uncertainty of only students with LD statistics in the selected universities, primary data collection in Kyambogo showed 121 students with disabilities, but only seven (five male and two female) were living with LDs. The argument of more male than female students was attributed to gendered cultural practices that favour a boy child rather than a girl child to access education that is experienced by many girls on top of their disability to join university. Other universities did not have clear disaggregated data on disability and thus could not even specify the exact number of students with LDs attributed to the invisible nature of the difficulty.

Students with LDs face barriers that limit their learning and achievement in different activities that take place in the classroom setting [22]. LDs tend to create deficits in adaptive behaviours that can interfere with individuals' learning progress. For example, reduced functioning and the deficiency of independence among students with such disabilities can hinder their involvement in the learning process [23]. In some cases, students may exhibit below-average intellectual functioning that impacts their academic progress [24]. Moreover, insufficient communication and social skills are additional key markers that such students can experience, and limitations that are associated with mental functioning can contribute to slowing students' learning progress. While concerns such as reliance on others and a lack of self-confidence are often experienced by students with disabilities [25], appropriate support can help them deal with a range of challenges [23].

AT can thus offer opportunities to overcome barriers and engage in learning activities, access information, participate in academic activities, complete key academic assignments, and foster a sense of inclusion that encourages them to keep pace with their nondisabled peers [23]. Additionally, it is worth noting that AT complements accommodations and individualized instruction. ATs thus may help students learn how to complete the task and it can help to bypass an area of difficulty. For example, when a student decides to listen to a digital version of a book, they are bypassing an area of difficulty. It is thus critical that students with LDs have access to the same opportunities to participate as their peers. In this regard, evidence has shown that ATs (computers, laptops and mobile devices) have changed many students' lives with disabilities [26]. Despite these changes affecting education, little attention has been paid to the experiences of students with LDs and how they incorporate technologies

into their daily lives. The recent situation analysis done in Makerere, Kyambogo and Kabale by Sikoyo et al. [27] and a subsequent peer-reviewed paper [28] focused on the preparedness of Uganda's public universities to provide education to students with visual impairment and staff capacities for inclusive teaching and learning of students with visual impairment in public universities respectively. This is not surprising, given that existing research often excludes this sector of the student population (LD). To ensure that equality and equity have been embraced, the Government of Uganda has created an enabling environment by enacting policies and regulations from the international to national levels over the past decades.

14.3 POLICY ENVIRONMENT

International and national policy instruments mandate access, equity and quality of educational services for persons with disability, and Uganda is a signatory. This section reviews key international and national policies that promote education accessible to students with disabilities.

14.3.1 International Existing Policy Environment

At the global level, Uganda has committed herself to the global disability agenda. We mainly focused on three policy documents that cover the rights of adults with disabilities: the 2030 Sustainable Development Goals, the UN and The Universal Declaration of Human Rights.

14.3.2 Commitment to the Global Agenda

The 2030 Sustainable Development Goal 4 is "To ensure equitable and inclusive quality education and promote lifelong learning opportunities for all" [29]. In September 2015, while Uganda was holding the UN presidency, the 192 member states of the UN adopted a resolution committing themselves to the 2030 Agenda for Sustainable Development. The 2030 agenda and its associated principle of leaving no one behind is not only a holistic approach, but also the most people centred drive to achieving sustainable development for all. This drive is also connoted "persons with disabilities as agents and beneficiaries of development" [30, p. 9]. Along with this drive was the obligation for lecturers and university systems to plan for, teach and assess all students in a manner that is appropriate to meet their learning needs, irrespective of their circumstances [31].

14.3.3 The Universal Declaration on Human Rights (1948)

This instrument recognises education as a universal right [32]. Denying any person a right to education is dubiously condemning such a person to a limitation in the enjoyment of fundamental rights. Article 26(1) desperadoes' discrimination in education at all levels and comprehensively requires states to make educational services available, accessible, acceptable and adaptable [32]. The requirements apply to persons with disabilities as well as the principle of equality and non-discrimination which is the basis of the human rights law (article 1(3)). This is enshrined in the philosophy of inherent dignity, and of the equal and inalienable rights of all human beings.

14.3.4 Convention on the Rights of People with Disabilities (2006)

On 13th December 2006, the United Nations during its General Assembly adopted the resolution drafted by the International Convention on the Rights of People with Disabilities (CRPD) [33]. The resolution was to promote measures for research and development of disability.The measures included friendly technologies, their availability and use such as specific technical devices designed to improve the daily lives of people with disabilities. Article 24 of the CRPD in 2006 [34] encourages public/private partnerships to ensure the provision of ATs with reasonable accommodation in education. In 2016, Uganda had a dialogue with the CRPD Committee regarding conditions for people with disabilities. Delegates from Disabled Persons Organizations demanded the need to translate the CRPD into amendments to national law, including the 2006 Persons with Disabilities Act, and the need for budgetary allocations to disability programmes particularly in education. These programmes included Disability Rights Fund [35] and Uganda DPOs Present Critical Rights Issues to CRPD Committee [36]. In 2018, Uganda endorsed the CRPD which mandates all states to protect, respect and fulfil the right to education without discrimination.

14.3.5 Regional Level

At the regional level, the benefits arising from integrating AT in learning to accommodate students with LDs in the general classroom compelled policy changes to promote its use and stimulate a positive attitude in teachers. For instance, the East Africa Community Protocol adopted in 2012 recognises the need to empower Persons with Disabilities with education as one of the special emphasis [37].

14.3.6 National Level

At the national level, we focused on policies that embrace rights of the people with disabilities.

14.3.7 The Constitution of the Republic of Uganda (1995)

Articles 21(1&2), 32(1) and 35(1&2) guarantee that all persons have the right to education [38].

14.3.8 Persons with Disability Act (2019)

The Ministry of Gender, Labour and Social Development in conjuction with its partners worked on the development of disability Act [39]. The Act was assented to by the President in September 2019 and gazetted in December 2019. The Act is the first legal document in Uganda to interpret ‘assistive devices’. The Act [Section 6(5)] guides the government to provide assistive devices to all learners with disabilities. The Act [Section 7(7)] continues to specifically guide the government that persons with disabilities should be provided with assistive devices at no cost or subsidized prices.

14.3.9 The Education Policy Draft (2011)

It stipulates that all children with special learning needs – including those with disabilities – should access learning in an inclusive environment [40]. This policy is guided by the Ministry of Education and Sports (MoES). The MoES established a department for Special Needs Education (SNE) to ensure; disability inclusive planning and budgeting; development of policies and laws for learners with disabilities that are in tandem with the constitution, and other national and international laws. Similarly, SNE is catered for and adequately programmed and managed right from curriculum development at the National Curriculum Development Centre (NCDC), the Directorate of Educational Standards (DES), and the Uganda National Examinations Board (UNEB).

14.3.10 The Universities and Other Tertiary Institutions Act (2003)

It was established by the NCHE of Uganda and details its mandates [41]. The Act obligates NCHE the responsibility to ensure disability inclusion in institutions of higher learning. It also requires that NCHE certify that an institution of higher education has adequate and accessible structures. The Act empowers the NCHE to revoke a provisional licence to an institution if it finds it not meeting the minimum requirements pertaining to infrastructure. Universities and Tertiary Institutions Act (2003) paved the way for the admission of students with disabilities, historically the blind and the deaf and more recently the little people and albinos [42]. At institutional levels, policies have been adjusted to provide for inclusive education [27, p.6]. Institutional policies are also in tandem with national and international policies and guidelines.

14.3.11 The Higher Education Students' Financing Board (HESFB)

The HESFB was established by an Act of Parliament in 2014 as a body corporate - semi-autonomous mandated to provide loans and scholarships to students intending to pursue higher education. The Board was inaugurated on 22 April 2014 and started operations in May 2014. In 2017, it started prioritizing students with disabilities in its loaning system. HESFB offers loans to students pursuing degree and diploma programmes, and such loans can be used to cover functional fees, tuition fees, research fees and assistive devices for students with disabilities.

14.3.12 ICT for People with Disabilities

The Uganda Communications Act 2000 promotes research into the development and use of new communications techniques and technologies. The National IT Authority-Uganda (NITA-U) Act (2009) provided for the establishment of the National IT Authority–Uganda (NITA-U). Section (f) of NITA-U mandated it to promote access to and use of ICT for people with disabilities. It is also responsible for the evaluation of university virtual learning environments for accessibility. A draft ICT for Disability Policy was published in 2017 [43]. It promotes sector-wide interventions to improve the lives of all Ugandans through ICT including inclusive education, which is to be achieved by developing and supplying accessible ICTs and ICT-enabled services in Uganda.

14.3.13 Gaps in the Policy Environment

The Universities and Other Tertiary Institutions Act Section 110 – Revocation of a Charter has no mention of universal design and accessible facilities among the set grounds for such revocation in case a university fails to adhere to its guidelines. Failure by an institution to provide universal design, accessible facilities, reasonable accommodation, appropriate instruction or teaching methods and qualified staff for special needs students is a path to the exclusion of students with LDs in the institution's programmes.

There is partial coverage of access for people with LDs by ICT policies. The relevancy of existing ICT policies to the promotion of ICT-enabled services such as eLearning that are accessible to those with LDs is low. The NITA-U Act 2009, the Uganda Communications Act 2000 and the National ICT Policy 2014–2019 on people with disabilities have identified with youth and women as a special interest group. Due to this generalization, the use of ICT as a means to remove barriers to learning for students with LDs is not highlighted [8]. This limits the relevancy of such policy instruments to the demand for access, equity and quality to educational services. Where specific provisions are made, they are limited to specific types of disability. For example, the Uganda Communications Act 2000 only refers to the promotion of accessibility of communication services to the hearing impaired. But, given the current technological and communications convergence, people with other disabilities particularly LDs are also affected by the telecommunication and broadcasting services regulated by the Communications Act 2000 [43]. The situation is not different from all policies running from international to national policies which are seen to be generic in nature.

There is no policy on eLearning accessibility to people with LDs either as part of other related policies or as a standalone policy. The Special Needs and Inclusive Education policy that was drafted in 2011 has not yet been operationalized although it offers an opportunity for further advocacy and engagements, a situation the Government of Uganda attributes to lack of financial resources for its implementation [19]. But even this draft does not mention eLearning, much less accessible eLearning. In the absence of such policy guidance, consideration of LD-specific needs in the implementation of eLearning in higher education institutions is limited, and in most cases non-existent. This is coupled with the nonexistence of any requirement for educators to be trained, and the education environment is not supported in providing eLearning that is accessible to people with LDs. This greatly disadvantages those living with LDs, especially given the potential benefits of eLearning to them.

Similarly, the ICT and Disability Policy has been in draft form since 2017 for the same reason of inadequate resources and makes no mention of accessible eLearning/education technology. The 2011 draft Policy on Special Needs and Inclusive Education does not specify AT and educational technology as one of the instructional materials, equipment and supportive services. On the other hand, the 2017 second draft Policy on ICT for Disability proposes comprehensive sector-wide interventions to improve the lives of all Ugandans by facilitating and promoting the use of ICTs but does not refer to making eLearning accessible to people with LDs.

While the Persons with Disability Act, 2006 provided for a 10% budget allocation on issues of disability, only less than 1% is being implemented in some sectors and not in higher education [19].

Access to ATs is limited, quality is negatively affected by constraints ranging from a lack of physical capacity, infrastructure, and learning materials to inadequate teacher capacity, negative attitudes and stigma [21], assessment and examination [44] especially right now where some of the universities are still operating in traditional pedagogies. The impact of the policy developments has thus been seen in the increasing enrolment of students with disabilities in higher education with no evident matching infrastructure [19,44]. The situation is even dire for the poor LD students where Zoom video conferencing technology has gained popularity in post-COVID-19, yet is accessed only by students who can afford data costs for the internet and devices such as computers, laptops and smartphones [27]. The disability university policies in Uganda do mention not the LD so there is no legal basis for AT for inclusive education.

14.4 THEORETICAL CONTOURS

A hybrid of a social model of disability and a rhizome framework was used. Drawing from Oliver [45], a social model of disability is "a theoretical understanding of the concept of disablement from a socio-political perspective" (p. 57). The argument is that disability is somewhat imposed on people with disabilities on top of their impairment by an oppressive and discriminating social and institutional structure [46, pp. 3–4]. The social model of disability mostly explains the relationship between people with impairments and their participation in society [45]. The model is hinged on the principle that impairment and disability are distinctively different [45,46]. The implication is that disability is a social oppression, not impairment, and that disability is a social construction, and to a large extent is culturally produced and culturally structured [45]. For equal participation for people with disabilities, the model demands the removal of the society's economic, environmental, cultural and other barriers against people with disabilities. The understanding of the social model of disability, in this chapter brings about the operationalisation of the right to education for persons with disabilities.

In exploring the experiences of students with disability, a metaphor of a rhizome was utilised drawing from philosopher Deleuze and psychoanalyst Guattari [47]. A rhizome is non-linear, non-hierarchical and open-ended and its nodes can be connected to other nodes forming an "assemblage" [47, p. 7]. An assemblage "is the process of making and unmaking…, arranging, organizing and fitting together" [48, p. 263]. Rather than being confined to the single tap roots of traditional Western ways of thinking: '[Rhizomes] affirm what is excluded from western thought and reintroduce reality as dynamic, heterogeneous and non -dichotomous … they propagate, displace, join, circle back, fold' [12, p. 27]. In this perspective, a rhizome was used in analysing various realities by giving voice to those that are hitherto unheard [12,49,50]. We took the understanding of experience as multiplicity. This is because, within rhizomatic thought, experience is viewed as contingent and fluid and a site where various forces interact rather than a fixed set of possibilities for agency within a set structure. In a rhizome, there are no fixed lines, but only lines of flight and lines of articulation that can rupture and at other times reconnect with the rhizome in unpredictable ways [47, p. 89]. This aided in the understanding of the often-times contradictory and ambivalent, ever-shifting realities of the students with LDs as they

engaged in AT for university education. Lines of flight can also represent the agency of the students, who sometimes are able to defy our common-sense understanding of their marginalised position, by displaying capacities for agency as they seek to access education. We thus analysed how these students engage with diverse ATs and how their agency interacts with their participation supported by the fieldwork methods.

14.5 FIELD WORK METHODS

A qualitative rapid ethnography design was used to carry out research from January 2023 to August 2023 in university settings in Uganda with ethical clearance from the Uganda National Council for Science and Technology. In Uganda, although there is no data available on students with LDs who transition into university education, our insider positionality in university education as lecturers with the support of snowball sampling enabled us to access students with LDs and their lecturers. In making an assemblage of student experiences, we plugged in as argued by Deleuze and Guattari [47, p. 23] to the 'field of reality' (data, theory and method), 'field of representation' (producing different knowledge, resisting stable meaning) and 'field of subjectivity' (becoming-researcher). In the field of reality, we interviewed thirty female students (connoted as $S_{1–30}$) and thirty male students (connoted as $S_{31–60}$) from six universities (public: Makerere, Kyambogo and Busitema; Private: Uganda Technology and Management University, Muteesa I Royal University and Victoria University) because of accessibility to information and existence of ATs from the insider perspectives. Researching in a non-linear way, rapid ethnographic methods of data collection such as participant observations in the classes that we teach, go-along to other classes in other universities as we interviewed using narrative inquiry. The purpose was to understand the lived experiences without interference from the researchers and give a voice to those that were hitherto unheard.

The student study population criteria measure for inclusion was that a student must have been living with an LD. All students were much older (between 25 and 28 years) in relation to the age group of their peers in the same undergraduate classes. This was attributed to especially failure to pass all papers resulting in repeating years and slow learning. The selection was also supported through snowball sampling to allow students with LDs to identify other potential subjects accompanied by the validation of lecturers who teach them. The identified students interviewed and their lecturers were from different programmes and professions of universities including ICT, Computing, Mathematics, Literature, Law, Social Sciences and Education. The intention of the study was not about the college, education and age of a student with an LD, but rather the focus was on the main characteristic of an LD. Parents (2 men: $P_{1–2}$ of 62 and 65 years old; 3 women: $P_{3–5}$ of 52, 57 and 60 years old, respectively) were interviewed. Key informants (2 men: $K_{1–2}$ of 48 and 51 years old; 3 women: $K_{1–3}$ of 44, 47 and 58 years old) and lecturers (3 men: $L_{1–3}$ of 37, 40 and 41 years old; 2 women: $L_{4–5}$ of 35, and 37 years old, respectively) were also interviewed. Consent was sought from all participants with assurance of confidentiality through anonymised numbers. The study was concluded at the point of saturation when no new information was coming to the fore. Secondary data was to get more nuanced voices through studying texts in class notes to understand their

experiences and literature. Within the field of representation, we sought voices that, even as partial and incomplete, produced 'multiplicities and excesses of meaning and subjectivities' [48, p. 263]. Rather than seeking stability within and among the data, we drew data that seemed to be about difference and not sameness as presented in the results.

14.6 RESULTS

We lay down the nodes one after the other, with nodes one, two and three revealing AT usage difficulties faced by students with LDs, forms of AT and usage for education, impact of AT on learning, completion of tasks and influence on engagement. Numbering these nodes is not to rank or structure them, but to label them succinctly, so that it is possible to suggest where pathways might connect and chasms separate them on the rhizomatic map. In this context, therefore, we sought to "work [the rhizome] for all its worth" [51, p. 281].

14.6.1 Node One: AT Usage Difficulties Faced by Students with LDs-A Bad Start

The choice of node to commence this mapping is random. Rhizomes have no commencement or end, but are "always in the middle, between things, inter being, intermezzo" [47, p. 25]. St. Pierre [51] insists on the vital role of rhizomes in a world in which we are all "becoming'': "[W]e…. must learn to live in the middle of things, in the tension of conflict and confusion and possibility; and we must become adept at making do with the messiness of that condition and at finding agency within" (p. 176). In the search for some form of messy agency, we choose to start with the story of a LD student with dyslexia. This story brings home the difficulties faced by many students with LDs; who are not only in universities with traditional pedagogies, policy and institutional failures, but also those who are poor and cannot even meet their AT needs for education. The student explained that

> I failed all my first year semester one examinations during Covid-19 period when the university introduced ODeL and I was made to stay put [repeat the first year]. I mixed up letters within words and so my sentences did not make sense. The cost of the AT that I need is quite high. I also lacked money to pay my assistant to support me, so I had to do it myself. I got difficulties in reading and writing given that the content of the exam was not supported by AT. Moreover, the university ODeL did not have in-built software to support my disability, yet I barely had the skills required for navigating the system in my condition. When the university re-opened after the lockdowns, the university classes had no structures/software to support me. The university physical lecture rooms use black boards and chalk or white boards and marker. When I got a chance to get AT from a friend who graduated, it was not the right one that I needed, and the content was also not supported because the lecturers are actually ignorant about the required ATs for my disability and have no skills to design such content anyway. The lecturers have not been trained, but also there is no policy to support us. Moreover, the disability office has not yet recognised students with LDs which implies that we cannot get any support from them. Lecturers are aware of the plight of students with disabilities, but unfortunately, they have no skills to identify, assess and give us appropriate AT to support required learning (S_1).

This story is reinforced by the first lecturer we interviewed who explained that

> The learning management systems could be having some support ATs, but the challenge is lack of skills to use them for learning. There is a need for specialized training and re-tooling of staff on AT usage for education. There is ineffective and inefficient use of ATs, pedagogical barriers due to lack of diversity and flexibility in teaching and evaluation methods which excludes students with LDs from meaningful learning. Lecturers have no patience, coupled with inappropriate curricular, but also the students have not been introduced to independence through use of ATs. The budget for accessing ATs is also low at the university level and so most the ATs are not accessible for everyone. Even this room accommodates only a few at a time and the ATs especially hardware's are not portable which limits remote learning (L_1).

Given that most universities have not yet started integrating ATs for LDs in Uganda, students with LD difficulties face complex challenges, especially with universities that are still running traditional pedagogies. However, universities that have started integrating ATs (Kyambogo University with leading ATs and expertise), and other universities explained how software, apps and hardware ATs are used for enhancing learning which leads us to node 2.

14.6.2 Node Two: Forms of AT and Usage for Education

Interviews with students, lecturers and parents revealed several software and hardware ATs used to support learning as discussed in the subsequent sections using screenshots taken while collecting primary data from universities starting with JAWS (Job Access with Speech in Figure 14.1).

A student we found at the SNE disability centre from the College of Computing explained how he uses JAWS in Figure 14.1 to learn narrating,

> To start my JAW reading the screen, I press the key combination INSERT+DOWN ARROW [this is the Say All command]. While using the Say All Command, I can press the LEFT or RIGHT ARROW keys to rewind or fast forward through the text or any content. I can also press PAGE UP or PAGE DOWN to increase or decrease the speech rate (S_{31}).

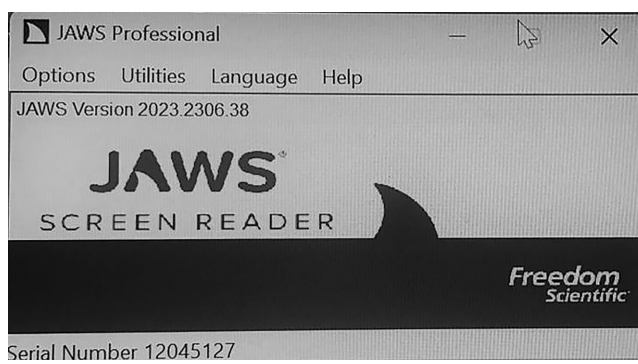


FIGURE 14.1 JAWS.

An expert in charge of SNE at the disability centre from a public university explained the usage of JAWS (Figure 14.1) that

> JAWS is a computer screen reader program for Microsoft Windows that allows not only students with reading difficulties especially for cognitive difficulties (dyslexia) to access content, but also those who have triple disabilities of LD, blind and visually impaired users to read the screen either with a text-to-speech output or by a refreshable Braille display. Jaws supports by translating text to audio. Lecturers give content in soft copies and students can read and attach meaning to learning materials. Students can also search internet and JAWS support them by reading/talking every letter that a student presses on the computer. JAWS has a variety of features, including Braille support, multi-lingual speech synthesis, and multi-screen support which enhances many of the students' performance. However, there are two main constraints; one, users can only access if they can afford to buy a computer/laptop and data given that the centre does not lend out; and two, many of the good books are not in soft copy which again excludes many poor students from learning. The centre has only two staff to support summarizing books to soft copy (L_1).

Voice Notebook (Figure 14.2) was another predominant software that was cited in all research sites of the study.

Voice Notebook usage for learning was explained to us while interviewing a student from computing who had a double difficulty of dyslexia and Attention-Deficit Hyperactivity Disorder. Attention-Deficit Hyperactivity Disorder (ADHD) is not an LD; however, it does make learning difficult. For example, it is pretty hard to learn or acquire a skill when you struggle to focus on what your lecturer is saying or when you seem not to be able to sit down and pay attention to a book. The student illustrated the following.

Voice notebook supports my learning through speech-to-text (TTs) which bypasses the tasks of handwriting and spelling, and allows me to concentrate on developing my ideas and planning my work. TTs allow me to see how words are spelt by reading them out loud (S_2).

JAWS and Voice Notebook software were predominantly used in all universities. The most common ATs were software that could be used as explained to the research

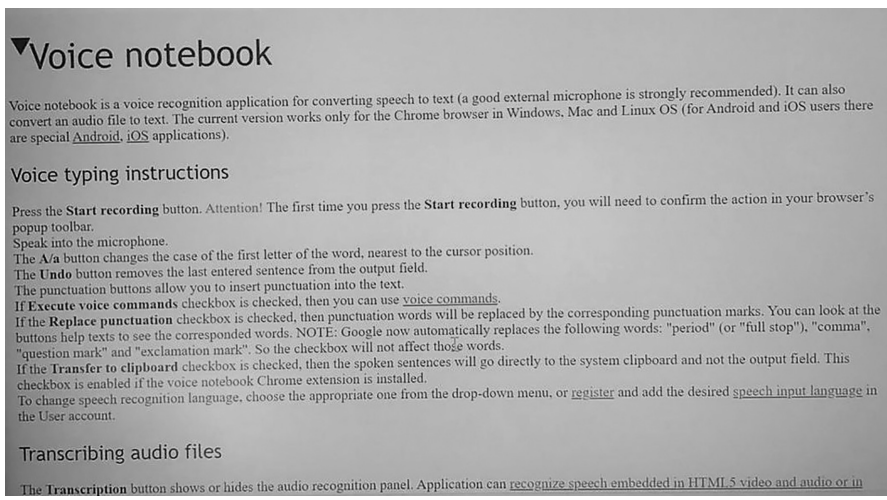


FIGURE 14.2 Voice notebook.

team by students, lecturers and parents including smart boards, tablet computers, iPods, laptops, and desktop computers, while projectors, flashcards, videos, and PowerPoint presentations were also used to facilitate learning. Additionally, while students indicated that the ATs were efficient in empowerment and stigma alleviation, lecturers suggested that the learners felt being in a less restrictive environment as they could effectively compete with their peers who were without disability. Moreover, students with LDs indicated that the use of tablets and computers to obtain apps also assisted them in improving their learning processes such as Taptapsee on the lower right side of the screenshot was used by taking a photo and the app describes it in a verbal/talking mode). Other apps (voice-over and Siri for iPhone, and Google TalkBack for Androids) work just like JAWS. For example, a student would ask the app to write a message, time-reminder and read texts for individualized activities and learning.

Inbuilt software functions in ICT College improved students' writing skills as attested by a student:

> Using spell check and grammar features helped me to communicate my ideas and write with confidence knowing that they can easily make changes. In addition, being able to submit my final assignment that is neater and better organized improves my previously lost self-esteem (S_{32}).

In consonance with the student, a lecturer in the ICT department who had students with LDs in his class explicitly explained the forms of AT they use for education.

> Text-to-speech (for example the Kurzweil 3000 convert text into spoken output. The program reads aloud digital text found on computers, smartphones, and tablets. Text to speech is used to read back a student's or lecturers original work, scanned or downloaded worksheets as well as textbooks for comprehension), speech-to-text (e.g., Dragon Naturally Speaking- is voice or speech recognition software that takes a student's or lecturers spoken words and converts them to typed words on a computer or other digital device also called Voice-to-text), Rocket notebooks (with the accompanying App) uploaded to various cloud services such as Google Drive, Dropbox and more, using a smartphone or tablet. This helps students to organize their work and create a digital portfolio especially in Math. Smart pens use audio recording technology and special notebooks to record the lecture's allowing students to take minimal notes. It is helpful to students that struggle to listen and write notes at the same time. Scanning pens use OCR technology which reads aloud text from worksheets, textbooks and novel studies. Scanning pens give students (especially students with dyslexia) greater independence allowing them access to content that cannot always be delivered in a digital format and graphic organizers (e.g., Inspiration) are the main software functions for students who struggle with reading, writing and organising difficulties (L_2).

A literature student explained that 'Text-to-speech software assists me with monitoring and revising my typed work, as hearing the text read aloud assists me in catching grammatical errors that might have otherwise gone unnoticed' (S_3).

A social science student (S_4) boosted about the software support to improve the perception of her work and the ability to write expressively. Other 2 students (S_{33} and S_{34}) from ICT noted that the program decreases the negative emotions they had associated with reading and provides them with a more complete comprehension of the text. Student (S_{35}) from education noted that 'pen top computers such as Live Scribe smart pens provided text-to-speech, and other organizational functions' as also attested by another student (S_6). A student from math (S_6) narrated that 'it is useful in

reading, but also provides auditory feedback during composition. It provides reminders such as "don't forget to carry" during multiplication questions'. A lecturer (L_4) explained that 'whenever such students with LDs use speech-to-text, the work is eased because the handwriting, spelling, punctuation, and grammar are catered for in the students' essays as well as high-level composition skills (for example in planning and generating content)'. She elaborated that 'a student who struggles to use printed material might have the choice to use an audiobook as an alternative. Unfortunately, some of the good books are not in soft copy' (L_4).

Graphic organizers helped students with LDs to improve the quality of writing as attested to by a lecturer who has students with LDs. The lecturer narrated that

> Graphic organizers provide an organizational framework that helped students to generate topics and content for research because it helped with the planning and organizational stages of writing, and use concept mapping software which increase the quality and quantity of writing. Using a web-based graphic organizer with procedural prompts also enabled students to produce better organized and higher quality essays, than they could have produced with handwritten organizers (L_5).

Hardware screenshots also supported learning as presented in Figures 14.3–14.11.

Ablecon (Figure 14.3) works more like a learner management system.

A lecturer in charge of the education disability centre explained the usage of Ablecon in Figure 14.3 that

> Ablecon centre has a camera which picks live sessions when the lecturer is teaching. For example, a lecturer can go to you tube and picks videos or records himself /herself, or using sign language, then transfers the recording to a flash drive to add caption for easy access to students. For those students who prefer large spaces to concentrate, they do not have to be sited in front to inconvenience others, but can come and pick a code and have live sessions on their devices [computer or phone] even at the back of the class or a nearby safe area. This AT can be used by all students of different disabilities given that it accommodates them through providing audio tape, content in large print, reduce number of items per page or line, provide a designated reader, and present instructions orally (L_1).



FIGURE 14.3 Ablecon.

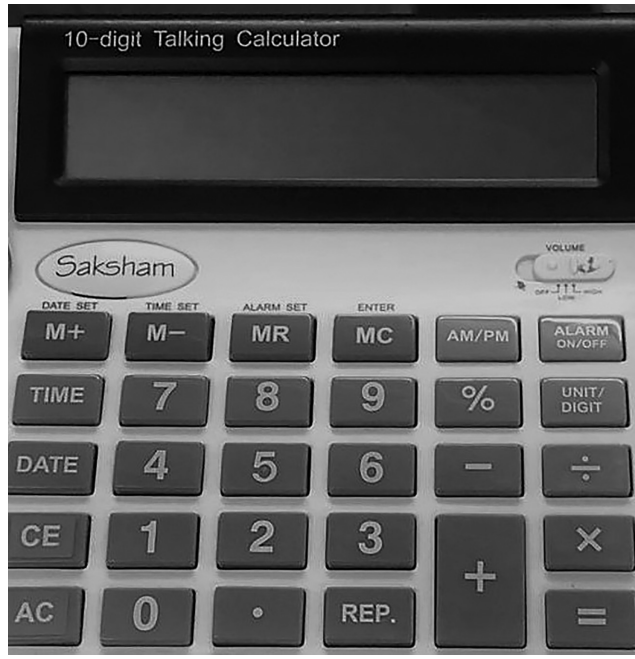


FIGURE 14.4 Talking calculator.

A Talking calculator (Figure 14.4) helps students, especially for math.

Some students ($S_{36–41}$) in the math department noted that scientific and talking calculators including graphing calculators provided visual conformation of the graph shape which motivated them to learn. A lecturer in the math department at a public university explained the usage of a talking calculator (Figure 14.4) that

> Students who have dyscalculia can benefit greatly from a talking calculator. It makes it easier to check assignments, read numbers and perform calculations. While the talking calculator is a fairly simple tool, it offers an exceptional benefit for students who would otherwise struggle in math classes (L_5).

Digital voice recorder pen (Figure 14.5) can be commanded to write and you move with it.

A student from social science explained the usage of a digital voice recorder pen (Figure 14.5) that

> I have both a LD and a physical disability limiting my fine motor control, so I find the pen useful for learning; especially because note taking is restricted to writing a single word to describe each part of the lecture. I can use the pen to replay just the section of the audio recording associated with each of my keywords (S_{42}).

Omni Reader (Figure 14.6) was designed for LD students, but especially those who also have low vision.

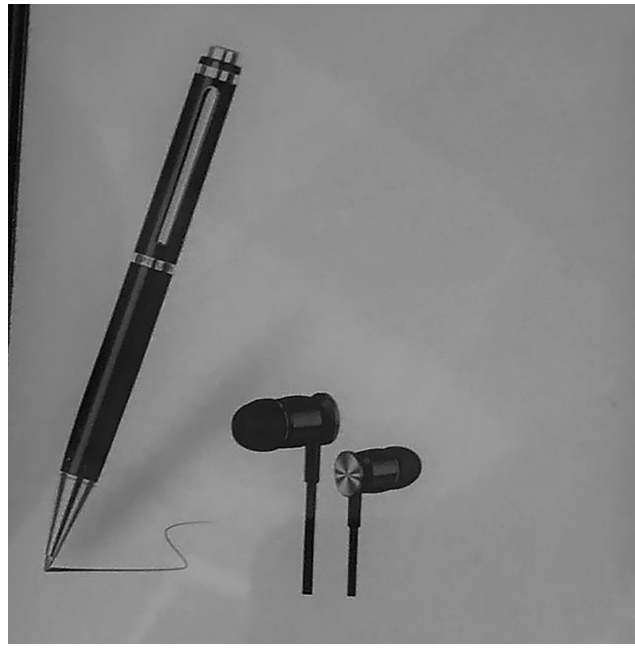


FIGURE 14.5 Digital voice recorder pen.

For Omni reader usage (Figure 14.6), a student from Law illustrated that

> I can place a hard copy book below the scanner, and after scanning, I enlarge the words at my convenience. I can also play around with colour and contrast. Its usefulness is with the machine reading out loud for me to hear. The used document could also be stored for future reference given that the device has a USB port which can be saved and transferred to other devices. I can also install an audio book and it begins reading for me. More importantly, I can connect Omni reader to wireless network and access online books (S_7).

Prodigi Merlin ultra CCTV (Figure 14.7) is used by LD students to access information easily.

A student from Law we found using Prodigi Merlin CCTV (Figure 14.7) illustrated how it is used by indicating that

> The only disadvantage is that it is not portable, but can serve several students at the same time if learning similar content. It has a camera which transfers information from a book to the screen for me to see and it reads the book loud. It can be tuned to any volume convenient for me at the time, I can also play around with colours and save my materials on USB drive. However, because it has no interaction on the tray, sometimes I dose off (S_{50}).

The Prodigi screenshot in Figure 14.8 was an example captured during data collection showing a constitution being projected on the screen and reading out loud by the Prodigi machine.

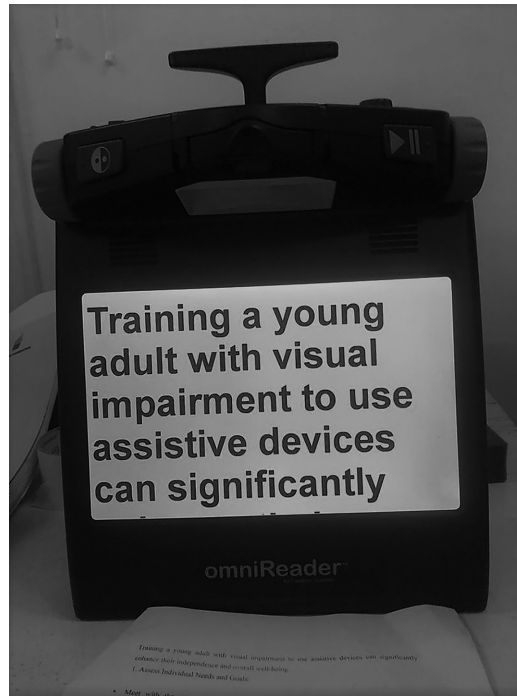


FIGURE 14.6 Omni reader.

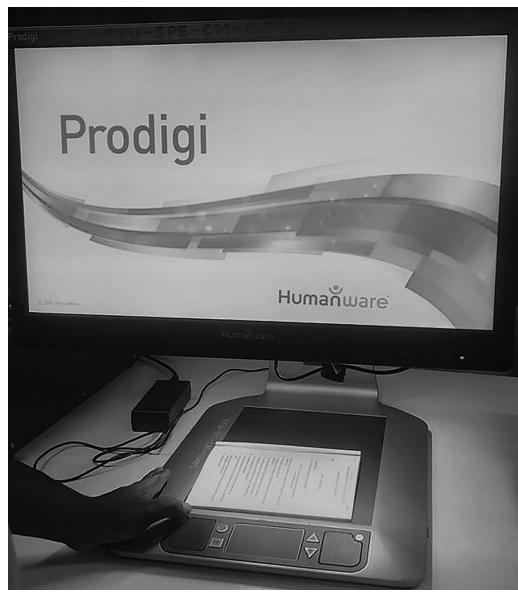


FIGURE 14.7 Prodigi Merlin CCTV.

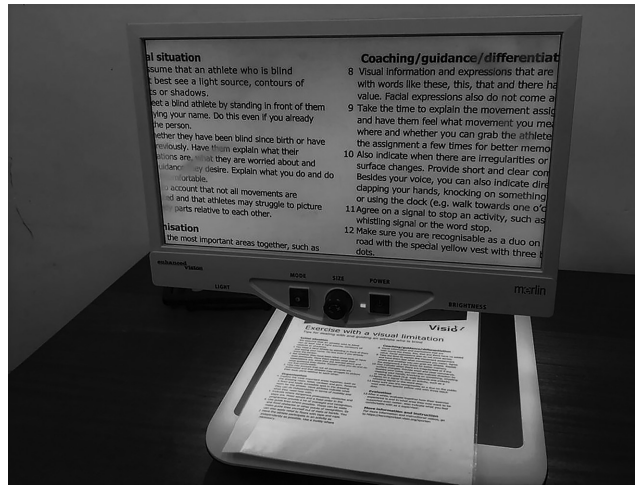


FIGURE 14.8 Prodigi screenshot reading.

The lecturer (L_1) interview brought to the fore an amazing insight by introducing to us the ultra CCTV machine which increases the interaction of students because of the tray which contravenes the students' interview of the Prodigi machine which has no tray interaction. We unfortunately noticed the disadvantage of the ultra CCTV machine of not being able to read out loud although can project information from a book to a screen. Therefore, it is more useful to use Prodigi Merlin CCTV.

A clear reader (Figure 14.9) was used by all disabled students.

S_8 from education explained the usage of the clear reader (Figure 14.9) that

> You simply place a book in front of it, take a picture and it will begin reading out loud automatically. No matter how the book is laid out (whether upside down or changed sideways), the device will read it.

A student (S_9) from development studies revealed that 'Perkins braille (Figure 14.10) is mainly for the blind to make braille notes. Albeit the noise made while typing, as a student with a LD, I am also blind and so I use it'.

The lecturer (L_1) narrated a sad story about an incident of Perkins braille (Figure 14.10) where a 'lecturer' stopped a student to enter a lecturer room in 2010 due to fear of bombs that were rampant in Kampala at that time. This story brings home the difficulties faced by not only the LD student who was denied access to class, but many disabled students whose stories are not captured in this chapter, but also exposing the limited knowledge of lecturers about ATs for education.

S_{10} from computing explained that

> The Braille embosser (Figure 14.11) helps to change content from soft copy to braille notes for the especially blind with LDs to access learning.

The usage of hardware ATs was in especially only two out of three selected public unities and a few students use software in the third public university. Very few students in private universities use software ATs (results reveal only software and not hardware) which led us to node 3 of AT's impact on education.



FIGURE 14.9 Clear reader.



FIGURE 14.10 Perkins braille.



FIGURE 14.11 Braille embosser.

14.6.3 Node Three: Impact of AT

In this node, an assemblage of various factors and relations emerge as students negotiate between different education programmes vis-à-vis their LDs. A focus is on eLearning education and institutional and infrastructural policy discourse in the selected six universities. The experiences faced while in the universities open up a window to demonstrate how some students were able to negotiate the stigma attached to LD and those students who retake amidst many other barriers. The metaphor of love in this chapter is two-sided. For the students with LDs; after stigma with fellow learners at lower levels, acceptance into universities to learn using ATs built their self-image from "academic failures to qualified professionals". The feeling of acceptance is thus referred to as "*love*" in such a setting of an institution referred to as a "shelter". The feeling we labelled our title '*a shelter of love*'.

14.6.4 Impact of AT on Student Learning

Some lecturers and some students supported AT usage for education for all its worth. Each interview discussed specific reasons for supporting AT usage and its impact on LD students' education. The personal insights were based on multiple personal experiences which provided an in-depth understanding of the concept concerned.

Lecturers narrated the AT's ability to attract the attention of LD students, transfer information swiftly, and reduce the amount of effort required for teaching. Moreover, they believed that the use of AT enhanced students' confidence and enabled them to attain a higher level of academic achievement. AT thus built LD students' strengths and worked on challenges such as speech recognition, writing, and numeric calculations. In addition, they noted that their students were able to gain essential skills through the use of AT that enhanced their competence in the learning process. Finally, lecturers highlighted that the use of AT had a positive effect on student learning because at most they feel loved and not discriminated when using their ATs. For example, they explained that AT streamlined the learning process by employing students' multiple sensory abilities. In addition, the use of AT enabled their students to access more comprehensive learning materials than other methods, which broadened their perspectives.

Students attending universities that were embracing ATs in the system and use in classes narrated factors such as improvement in their communication skills by facilitating swift responses, promoting students' attention, and engaging multiple sensory abilities. More importantly, students explained that such ATs prompted note-taking, typing, and listening skills that improved their learning approaches and believed that the use of AT could foster comprehension abilities and learning capacity and facilitate students' academic progress. They however pitied those students with LDs who attend universities without ATs for missing out on the benefits of AT for education. This was attributed to difficulties in accessing for some, economic shocks of the country and lack of funding from the government to support ATs for every student with LDs.

14.6.5 Impact of AT on the Completion of Assignments

Key informants, parents, lecturers and students explained that AT can facilitate their completion of assignments, for instance, by motivating them to complete their tasks efficiently. They also reported that AT could help such students access a vast range of learning materials and improve their focus and concentration. Moreover, the lecturers believed that the study habits necessary for executing academic tasks could be enhanced easily and quickly if students with LDs use AT. However, some lecturers (L_3 & L_5), and key informants ($K_{1–5}$) noted that AT could also create confusion and act as a source of distraction. Some students and lecturers are not able to use ATs and the selection of appropriate AT poses challenges even if they want to use AT.

14.6.6 Influence of AT on Engagement

All those participants who had integrated AT into their education system agreed that AT can foster the engagement of students with LDs. The employment of simplified information and sufficient feedback promoted increased participation in learning. Lecturers explained that ATs nurtured psychological and mental preparation, supported students' attention and enhanced their information retention capacity. Moreover, they explained that AT made the learning process fun, and easy due to the interesting content, and the entertaining and enjoyable educational activities it facilitates. Lecturers elaborated that ATs engaged students' multiple sensory abilities, and

they also motivated and increased the students' focus. Nonetheless, some lecturers ($L_{3\ \&\ 5}$) entreated that, in as much as the AT made learning engaging and immersive for students with LDs, it had its equal share of distraction.

14.7 DISCUSSIONS

The policy level revealed that Uganda has drafted enabling policies and laws aimed at protecting the interests of people with disabilities and creating equal opportunities for people with disabilities. However, there are still considerable policy gaps and key policies such as the Policy on Special Needs and Inclusive Education and the ICT for Disability Policy that are still in draft form. MoH [19] attributes the delay in passing the policies to a lack of financial resources to implement the policies once they are passed. The delay in passing and implementing inclusion policies shows that the Government of Uganda has yet to give inclusion issues in general, and inclusive education in particular, the priority they deserve.

The lack of substantive policy instruments limits the demand for access, equity and quality to educational services. This can explain why the ODeL guidelines released by the NCHE in July 2020 to guide remote teaching and learning activities during the Covid-19 lockdown are silent on ensuring that all remote learning activities, and in particular the LMS and its content, are accessible to students with disabilities, even though 12.4% of the population have a disability [18]. The global and national antidiscrimination laws and treaties on education and ICT must be accompanied by country-specific statutes that specify the steps that should be taken to facilitate inclusion in education and ODeL [8,15]. It has also been noted that there is a substantial lack of data to inform policymaking [8,52]. The implementation of the existing policy framework is weak attributed to insufficient resources [19]. Thus, despite government efforts, students with LDs continue to face difficulties accessing quality education.

We thus argue that the term "learning disability" and the emphasis on neurodevelopmental disorder do not reflect the complex lived experiences of those who face digital exclusion because of how they perceive and interact with the world around them. In disability studies, especially in this specific one, this tension has been framed as a contrast between a medical and a social model of disability. The legal and policy documents cited in this study are strongly influenced by the medical model of disability, which sees neurodevelopment disorders as defects to be cured. In the medical model, such people are provided with assistance to function in a society designed for able-bodied people. In the social model, on the other hand, society itself has to change and remove barriers to participation for this case universities, parents, parents and students.

Regarding AT usage difficulties faced by students with LDs, the literature reviewed revealed that ATs emerge as suitable instruments for both accessibility and inclusion of students with LDs in universities around the world, as well as for meeting their educational needs during their learning process. However, many studies also report similar difficulties as those faced in Uganda in the usage of ATs to access eLearning. For example, an evaluation of higher education websites for 20 universities across the globe did not comply with WCAG 2.0 guidelines to an acceptable

level [53]. Yet students with disabilities face difficulties with contacting and obtaining support from the disability office, which potentially results in a vicious circle of exclusion [54]. From interviews with lecturers from a South African ODeL institution, Zongozzi [55] found that lecturers are well aware of the negative impact that lack of accessibility students face with disabilities, but find it difficult to identify students who have disabilities and to provide appropriate support. The lack of educational resources in alternative formats is a common problem in Higher Education Institutions in Ethiopia [56].

The opening story of this chapter results with a student living with dyslexia reveals that negotiating rights to education starts with the policy of universities, structures, and skills of both staff and students for the appropriate ATs and usage. It is also true that exclusion and challenging participation in education is an entanglement between various non-linear factors. For example, while the constitution [38] policy provides for education for all, many public universities still lack the necessary infrastructure partly because they are not fully supported by the government budget. This is a reflection of a challenging state exclusion of students with LDs from education in the research sites. AT is supposed to improve the functionality of students with LDs for education, but for some students, this future is not guaranteed.

Disguising ourselves as sponsors to provide a right to education through providing devices for her education, one of the lecturers (L_4) that taught her changed the "lack of infrastructure story, limited skills to select the right AT, limited skills to develop content supported by ATs and no policy guidelines to enforce AT implementation". She narrated that, the reason for failure was rather seen as academically weak to pass examinations. In drawing a node in her rhizo-narrative, we connect this to the dissonance between institutional practices, the persons with Disabilities Act, 2019 [43] which promises AT for all, yet with no supportive budget, ICT policy (2014–2019) and Education policy of 2011 [40] which stipulate education for all, but not operationalized to date 12 years down the road.

Online examination is one of the machinery of power used in dominant universities to exclude students with LDs. Such practices to control quality in preparation for final examinations do not consider the flights [47] of students with LDs given that some content is not supported by AT. This injustice of university exclusion within the context of LDs is more accentuated as final examinations are used as bait to make students with LDs fail to sit similar examinations like nondisabled students, thereby failing those who have LDs.

AT Usage Impact in Uganda, through the literature reviewed suggested that there are limited studies on the use and impact of AT for education in university settings for students living with LDs. Research in this field over the last decade is not very relevant in line with this topic of focusing on LD. We can also highlight that the impact and repercussions of these studies are non-existent since there are no articles on this specific topic, yet many are available for general students with disabilities. The more frequently a paper is cited, the more often the scientific community recognizes the influence or impact of the cited topic. The scarce existence of scientific literature and its low impact is one of the main problems that may hinder the implementation of AT in classrooms because this field is underdeveloped in Ugandan universities. Similarly, the limited existence of scientific literature on the use of AT for the

education of students with LDs makes it difficult to answer the research question posed. Even so, the scanty findings help us to lay the foundations for working to improve the policies in the education of students with LDs, both by offering AT for education on the market and by working on awareness raising to respond to the call of Molero-Aranda et al. [57]. The study has however been done in other countries and some of this study's findings reinforce previous studies although new information has also come to light.

Results of this study in consonance with Paz and Stringer [58] reveal that AT has the ability to be the great equalizer for many students with LDs to access university education and meaningfully participate in society. Similarly, Hetzroni & Shrieber [59], and Blackhurst [60] perspective of AT is that it increases individual performance and productivity of people with LDs. In other words, the application and employment of ATs enable students with LDs to optimize functional participation in education to independence [61].

The use of AT was found to improve the academic performance of students with disabilities. It helps students to develop autonomy and participation [62,63] which increases the acquisition of social skills [64,65]. AT contributes to the development of skills that provide stimulation, fit instantly to a student's level and provide instant feedback for improved learning [66] while performing tasks or functions that they would otherwise be unable to do [67]. AT improve the performance of students with disabilities and improve educational outcomes [68,69]. Thus, AT provides educational prospects for students with LDs and brings out their cognitive potential [13]. As a result, lecturers and students achieve their educational objectives by being active participants in the learning process.

Computer-assisted instruction helped learn by providing spelling and expressive writing skills [70,71], as such software reduced distractibility [72], and helped students learn to read [73] and achieve other academic outcomes [74]. Practice of math drills was eased [75] due to the ability to memorize math facts more easily and developed a more positive attitude towards math than students who did not use computer-assisted instruction [76]. Inbuilt software functions improved the writing skills of students [77]. Text-to-speech software was beneficial to students for understanding text when unfamiliar words were read to them [78,79], reading fluency and reading comprehension [80,81], as well as writing precisely [74,82]. Therefore, text-to-speech software helped students to retain more information through listening than reading especially in literature classes.

AT thus allows such students to bypass the demands of typing or handwriting; freed from these effortful tasks and their work would contain fewer errors [83]. Thus being essential for students who cannot concentrate in class [84]. AT also provide reminders to accomplish tasks [85,86]. On the contrary, one new user of the software in the literature class (female) was frustrated with the software because of her inability to efficiently edit the program's text output.

New information revealed that ATs nurtured psychological and mental preparation, supported students' attention and enhanced their information retention capacity. Moreover, they explained that AT made the learning process fun and easy due to the interesting content and the entertaining and enjoyable educational activities it facilitates, noting that since such technologies engaged students' multiple sensory

abilities, they also motivated and increased the students' focus. Nonetheless, one female lecturer entreated that in as much as the AT made learning engaging and immersive for students with LDs, it had its equal share of distraction.

Finally, it is worth mentioning that, these ATs promote motivation and increase students' attention and learning for education.

14.8 RECOMMENDATIONS: WAYS TO IMPROVE AT FOR EDUCATION

Policy Level: A need to create a policy on AT usage supported eLearning for students with LDs which can either be a standalone or be part of the Special Needs and Inclusive Education Policy, which is before the Ugandan Cabinet for approval. At the minimum, the policy should address requirements by global and national disability laws, and the Web Content Accessibility Guidelines by the World Wide Web Consortium as proposed by Baguma and Walters [8]. This can be achieved by identifying representatives from key stakeholder groups such as educators, administrators, developers, IT support team members and people with LDs. Based on the gaps in the university's infrastructure level of eLearning accessibility, institutional action plans will be needed covering milestones, tasks, and target dates to bridge the gap. Accessibility coordinators can play an important role in the delivery of such action plans. There is thus a need to make people with LD a standalone category of stakeholders in education and ICT policies instead of treating them as one of several special interest groups. In order to achieve this, people with LDs should be closely involved in policymaking. Cover all disabilities in the Communications Act such as in mass media, telecommunication, and the Internet, especially since the borders between those three types of communication channels have been significantly reduced. The convergence of media technologies and the digital forms of access and delivery offer more ways for the audiences to engage with the media, and these forms of access are extensively used in ODeL (video, podcasts and interactive presentations).

Student Level: This study recommends that enhancing the impact of AT in enabling participation requires an individualized and holistic understanding of the value and meaning of AT for the individual in their unique context.

University Level: To ensure accessibility of eLearning content, university administrators, web developers, IT administrators, educators, student leaders and other stakeholders who play an active role in decision-making in universities, developing and maintaining an accessible eLearning platform and developing eLearning content should be sensitized and trained in AT usage supported content systems based on their current skills and attitudes, and what actions need to be taken. In our results, we documented the story of a lecturer with experiential knowledge of AT usage which highlighted several issues that can be addressed with appropriate eLearning systems. For example, videos with captions describing the audio track; audio with a text transcript, and provision of alternative text extend the lecture notes. Lecturers have a primary role in promoting the use of ATs. Therefore they need to acquire the necessary skills and competencies. Such gaps call for interventions that target the social lives of students with disabilities, teaching strategies and instructional materials to address the diverse learning needs of all learners in an equitable manner [87]. Drawing from

UNESCO's (2022) report [88], calls for flexible teaching and learning methods with innovative approaches to teaching learning- aids and equipment as well as the use of ICTs to address learning needs.

A lot of work needs to be done to improve AT research [89]. Little research has been conducted on the use and impact of AT in universities, and only a few researchers are conducting systematic, well-designed research that can lead to confident conclusions on how AT can be used to affect learning [89,70]. Interactive whiteboards as noted by one of the lecturers that support students with LDs are used in particular for students with 'ADHD' which is considered as a less visible disability. So, the utilization of the interactive whiteboard technology that can offer visual stimulation of the lessons delivered in the classroom, can help the students stay focused and undistracted, especially with the use of colourful lesson plans that have the ability to teach them what they really need to learn while entertaining them. Mechling et al. [90] posit that smart boards can improve the sight word recognition and other essential skills of students with LD. Organization and memory can also benefit students via hand-held gadgets that help students with intellectual disabilities, keep track of their notes, schedules, calendars, and tasks. In addition, Mechling et al. [91] go ahead to report that smart boards could help students with LDs match words with specific pictures, thereby improving their grocery lists and shopping experience in the study by enhancing their organization skills.

AT can reduce students' dependence on others to read, write, and organize their work [78,92]. When provided with effective strategy instruction, outlining programmes and concept mapping software can help with planning, and word processing, spell check, word prediction, and speech recognition can offer support for transcription and revision [93–95].

While AT can support struggling learners, MacArthur [93] cautions that technology by itself has little impact on learning. For students to benefit from the technology, educators must have an understanding of AT and how to embed AT within quality instructions [96,97].

Despite the enthusiasm that may surround the application of AT in the classroom, AT is not a panacea. Lack of common vision, limited training, access to support services, insufficient funding, and lack of lecturer time are commonly cited problems regarding the implementation of AT [98–100].

14.9 CONCLUSION

This chapter responds to Sustainable Development Goal Four; other international and national policies on people with disabilities with a more specific call of Baguma and Walters [8] in Uganda to extend the study of ATs to people with neurodiversity. Most importantly, it responds to the CRC Press, Taylor and Francis Group call for book chapters on Interactive Media Technologies for personal and commercial applications and their usability evaluations. This study found that although the Government of Uganda has created an enabling environment through the enacted policies, its response to the education needs especially with innovations of remote learning, and learning platforms does not favour students with LDs. Results inform the education interventionists to benefit students with LDs not only in Uganda but

also in other countries where replication can be done especially during these days of uncertainty of global pandemics. We found numerous AT accessibility issues to education, even though we mostly focused on accessibility to people with LD. This is consistent with international results, even though our review of the legal and policy landscape in Uganda identified numerous issues that may be addressed in other countries. There are two areas for future work that we wish to highlight. The first area relates to more research on AT usage for specific difficulties. The definition of disability cited earlier highlights neurodisability impairments of mainly cerebral palsy, autism and epilepsy, yet our definition focused mostly on the general LDs. There is a need to extend the accessibility analysis to cover the needs of people with mobility impairment (e.g., those who have lost the full use of limbs-arms, hands, or legs due to traffic accidents, illness or conflict). The second area relates to a universal learning design in university ODeLs.

DISCLOSURE STATEMENT

No potential conflict of interest was reported by the author(s).

Funding: Personal

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