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TEACHING AND LEARNING OF DIGITAL LITERACY SKILLS INVOLVING LEARNERS WITH VISUAL IMPAIRMENT IN ZAMBIA: A DESCRIPTIVE CASE STUDY OF SELECTED SECONDARY SCHOOLS IN NDOLA, ZAMBIA

Robertson Kalangwa Kaluba[1],
Joseph Mandyata[2],
Stabile Namwai Ng'ambi[3,]
Kalisto Kalimaposo[4i]
[1]Research Scholar,
Institute of Distance Education,
Postgraduate Studies,
University of Zambia,
Zambia
[2,3,4]Research Supervisor, Dr.,
University of Zambia,
Zambia

Abstract:
Teaching learners digital literacy skills is a challenging experience for both teachers and learners, especially for learners with visual impairment. The disability, such as visual impairment, comes with its own complexities that make learning digital literacy skills quite difficult. It was in this context, the present study sought to explore how learners with visual impairment were learning, acquiring and developing digital literacy and technical skills in the Zambian secondary school system. The study used a descriptive case study research design supported by qualitative approaches. The sample size was 12 (3 teachers and 9 LwVI). The participants were drawn from special education schools in the district. Homogeneous sampling was used to select teacher participants, while, learners were selected using an expert sampling technique. Data was collected using in-depth interview guides and observation checklists. The data from fieldwork, was analysed using thematic analysis approaches. The findings revealed that LwVI were learning basic digital literacy skills, such as; keyboarding, input and navigation skills, word processing skills, online communication, spreadsheets and digital presentations. On technical skills, it was found that LwVI were being exposed to: hardware and software knowledge; how to apply software skills - online research skills; information management skills; digital content creation; how to use digital media as well as digital collaboration. It was, however, also found that LwVI often faced several challenges in

[i] Correspondence: email kalangwarobertson@gmail.com, joseph.mandyata@unza.zm

attempting to learn digital literacy and computer technical skills. These ranged from: lack of accessible to assistive technology, resources, difficulties with visually-based online platforms and issues of inadequate collaboration in the teaching and learning of such skills. The study equally, showed that there were socio-economic barriers, teachers' teaching inadequacies, high cost of devices, internet connectivity challenges and electricity outages, which negatively impacted on the teaching and learning of digital skills in the case of LwVI in secondary schools in Zambia. The study concluded that, although findings cannot be generalizable to other areas in Zambia, efforts were being made to expose learners with visual impairment to digital literacy skills in the study schools. This has the potential of enhancing the learning of LwVI with time. The study recommends that schools encourage teachers to use strategies which are more inclusive and sustainable in the teaching of digital literacy skills to LwVI. Additionally, teachers should make efforts to use differented learning to ease access to digital literacy skills among LwVI.

Keywords: digital literacy skills; technical skills; visual impairment, special education

1. Introduction

Educating learners with visual impairments can be a significant challenge, especially in areas where digital literacy and computer-based technical skills are required to access the classroom curriculum. It is for reason we see UNESCO, (2015) calling for introduction and promotion of the learning of digital literacy involving learners including those with visually impairment. The position is their aimed at enabling learners maximize access to school curriculum, equalize learning opportunities and promote quality education for all learners. UNESCO (2018), in fact sees acquisition of digital literacy by learners as a basis for a solid academic foundation. This is in line with the Sustainable Development Goal 4 (SDG 4), which calls for increased exposure of learners to digital literacy skills with a view of improving quality of education. Futher, it has been reported that, increased access to digital literacy skills, has the potential of promoting lifelong learning opportunities regardless of the nature of child's disablement (Time for Global Action for People and Planet, 2015).

Based on the UNESCO's (2015 & 2018) emphasis on the need for learners to access, acquire and develop digital literacy skills to support academic work principle, teachers have found themselves now, teaching learners digital literacy skills (Chipili, 2017). With this development in the school curriculum, the present study aimed at exploring the experiences of both teachers and learners on the teaching and learning of digital literacy skills involving learners with visual impairment in Zambia. It is against this backdrop that the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD, 2006), through Article 9, has called for increased access to digital skills and utilization of assistive technologies to enrich their academic experiences. We see therefore, the

UNCRPD (2006) emphasizing on the inclusion of digital literacy skills in the school curriculum for to learners with visual impairment. It is this development which has led to the promotion of learners' access to Information and Communication Technologies (ICT) in the education system. In acknowledgement of UNESCO's position over the call for learning of digital literacy involving LwVI, Indongo & Mufune (2011) posts that early exposure of learners with disabilities to digital literacy has potential ot providing more benefits to learning experience to LwVI.

In Zambia, the 2013 and 2023 Curriculum Frameworks records, when effectively integrated into the school curriculum, digital literacy can increase learners' ability to to search for digital information likelt to support their learning (Siakalima, 2021). As a result we have seen increased exposure of learners to digital literacy skills with a view of providing opportunities to acquiare, devlop and apply skills to their learning (CDC, 2013; 2023). The Zambian government, for example, through the 2023 curriculum framework, has called for full digital transformation in its school curriculum reform. It has emphasized on the need have morst learners exposure to digital literacy with aview of improving academic performance of learners including the LwVI. In support of this view, Kalimaposo, Mphande, Hambulo, Mandyata, and Kaulu (2025), belives that promotion of quality education has a lot to do with learners possing sufficient digital literacy skills to enable them go beyond classroom experiences and interact with the world beyond to be schooled.

Minstry of Education (MoE) in Zambia therefore sees digital literacy education as a significant tool in promoting access to academic information and communication as learners grow and develop academically. In addition, Muzata (2020) and Gul (2022), view digital literacy as a fundamental tool for increasing access to quality edication for all learners including the LwVI. Limited access to digital literacy skills by learners simply contribute to learners' frustration and dissatisfaction in academic circles especaiily among learners with disabilities such as visual impairment.

Arising from the significance attached to digital literacy in education practice, learners with visual impairment (LwVI) need to possess basic digital literacy skills and, where possible, some level of computer technical skills to gain and benefit from learning (Chipili, 2017) and Arslantas & Gul (2022). As a result in Zambia, we see learners including the LwVI learning basic digital operations, computer software knowledge and applying digital knowledge and skills to their schoolwork although with challnges. Through such an initiative, with visual impairments (LwVI), have found themselves learning digital literacy skills with hope that such skills would help in improving their academic work. Although it appears that the Zambian government has been making strives, to provide digital literatcy skills to LwVI, less of experiences on teaching and learning of digital literacy involving LwVI, has adequately captured and documented to inform classroom practice and policy. We continue to recive report of mixed feelings among different stakeholders on the learning of digital literacy involving involving LWVI in the Zambian school secondary system thereby calling for a more comprehensive

study. It is against this backgrouns, the study sought to explore the the teaching and learning of Digital Literacy skills involving learners with visual impairment (LwVI) in selected Zambian secondary schools.

2. Problem

The Government of the Republic of Zambia, through the Ministry of Education, introduced Computer Studies in schools through the 2013 curriculum framework (CDC, 2013). It has also gone further in its 2023 Curriculum Framework, to emphasise more on the need to expose learners to digital literacy educationas as a way of providing quality education. The ministry has for example, made learning of digital literacy compulsory in schools. Through a paradigm shift such as this one, learners with visual impairment (LwVI), have found themselves beside use of braille writing, learning how to use digital skills to do their school works. Mulauzi, Walubita & Pumulo, (2018) and Siakalima, (2021) posts that, allowing learners to access, acquire and develop digital literacy has the potential of improving the quality of learning, an idea held by the Ministry of Education throught its revised curriculum in Zambia (MoE, 2013; MoE, 2023). With this development, teachers of LwVI and learners themselves aare now learning digital lieracy education as ana academic subject in the Zambian education system as part of school curriculum. This development therefore, raise the question as to how has been the teaching and learning of digital literacy skills in Zambian secondary schools since the introduction of the 2013 and the revised 2023 curriculum framework? The present study, is thus an attempt to explore the teaching and learning of digital literacy skills involving LwVI learn in selected secondary schools in Ndola, Zambia. To address this problem, the study was guided by the following objectives:

1) ascertain digital literacy skills taught to LwVI,
2) establish computer-based technical skills offered to (LwVI),
3) probe the learning of digital literacy skills involving LwVI,
4) explore challenges surrounding the teaching and learning of digital literacy involving LwVI.

3. Significance

In this study, it was hoped that the findings would uncover the digital literacy and computer-based technical skills being taught to LwVI, as well as the approaches and challenges teachers and learners encountered as they engaged with digital literacy education in Zambia. It was also believed that knowledge generated from the study would inform classroom practice on the teaching and digital literacy education involving LwVI. Additionally, it was hoped that the study outcomes would provide a clearer understanding of the classroom practice and challenges. In the process the study would

help to create opportunities for much-improved teaching and learning of digital literacy and computer technical skills in the study schools.

Further, the study believed that the findings would help inform various stakeholders, such as school administrators, education managers, curriculum developers, and policymakers, on the teaching and learning of digital literacy and computer technical skills in Zambian secondary schools. Lastly, the study aimed to contribute to the existing literature on the teaching and learning of digital literacy and computer technical education in Zambia's secondary school system.

4. Theoretical Framework

Cook & Hussey's (1995) model of Human Activity Assistive Technology (HAAT) guided the study. It is a framework that organizes the components involved in learning of assistive technology (AT). It is centred on acquisition of digital skills, application of skills, the individuals leranign such skills, nature of activities and how impacts use of assistive technology (Cook & Hussey, 1995). The goal of the AT is to help an individual perform an activity by considering the task's skill demands and the environment in which they operate. The model is often seen as a three-dimensional sphere consisting human, activity and AT within a cube representing the context and digital literacy skills taught. In this study, the model was seen to be more relevant to guide the present study because, had the capacity to provides an interaction among the three facets involved that is: digital literacy skills needed, teaching of such skills and learning of the skills itself.

The model provides an interplay between theory and practice in the learning of digital literacy and computer technical skills. It explains how learners perceive assistive technology in the context of supportive learning of technological skills (Siakalima, 2021). The application of the HAAT model to this kind of study brings in the experiences of learners with visual impairment understanding, perceived obstacles and opportunities it creates for the learners to acquire digial literacy and how influences their path to academic work.

4.1 Topographical Features of Study Sites

The study was carried out in one district in Zambia - Ndola. The district is located in the Copperbelt province of Zambia. It is an industrial/commercial hub, hosting copper smelting industries and commercial enterprises. It is surrounded by mining towns - Luanshya, Kitwe and Mufulira. The economic activities are mainly based on mining, processing, trading and related economic activities. It has a total area of 958.6 km² with a population of 624,579. It is highly urbanised, with a population density of 185.7/km² (Zamstat, 2022). The district has a good number of health, educational and social amenities. Children in the district are more exposed to the internet and other digital services, resulting in high levels of digital literacy among the youthful population although less so among those with disabilities. Its annual population growth was

reported in 2022 to be around 3.9%, far higher than most rural districts, whose growth rate averaging about 1.9% (ZamStat, 2022; Brinkhoff, 2023). Based on the statistical information cited, Ndola has a high population growth rate and indeed a school pupil population was quite high and include a high number of individuals living with disabilities, justifying the high investment in internet services as compared to most rural Zambian districts.

In the context of education provisions, Ndola has a school population of 88,435 in 177 public schools and is serviced by a teaching population of 21,118 with an average of 42 pupils per teacher. This ratio is significantly high in the context of teaching skill-based subjects such as digital literacy and mor so to learners with disabilities. It is, thus challenges for teaching staff and administration to meet the learning needs of learners in practical stubjects like digital literacy skills. Given such a high learner population, teachers must have the ability to apply appropriate approaches especially in practical skills for the learners tp effctively learn. Teaching of digital skills especially to learners with disablities, is further completed by limited digital resources, insufficient practice time, space and teachers' limited instructional skills in digital literacy education.

5. Review of Related Literature

In a study conducted by Teye (2023), aimed at establishing learning of digital literacy skills involving learners with disabilities in Nigeria, it was found that learners were exposed to basic computing knowledge but less to computer-based technical skills. The study reported that learners with visual impairment, for example, were taught basic computer operations such as word processing skills, online communication and aspects of computer literacy skills but not necessarily the technical skills such as software use, it programming and cybersecurity, a situation which might be similar in Zambia. In another study by Chipili (2017) in Lusaka, Zambia, it was observed that, through constant exposure to computing learning activities, learners with visual impairment were able to quickly adapt to computing environment and able to gain mastery of the computer operations although with difficulties, a situation which might not be the same with those in in Ndola in Zambia. In Chipili (2017) study, teachers were required to show commitment to their learners learning of such skills through making efforts in learning themselves the skills before teaching the assigned learners. Haneefa and Syamali (2014) in Saudi Arabia added that learners with visual impairment felt more independent when equipped with necessary digital skills and were able to explore information on the internet to support their academic work unlike when depended on brailled texts.

As a result, Haneefa and Syamali (2014), concluded that LwVI can gain computing knowledge and competence and ably use software and applications to enhance learning, given a chance to acquire such digital literacy skills early enough in their academic life.

Although Haneefa and Syamali (2014),did expose the positive role played by digital literacy skills among learners with visual impairment in Nigeria, it did not provide in-

depth- information on what skills were taught as part of content of the digital literacy curriculum. For example, it was not clear from the study, whether learners with VI were exposed to creation of digital content and application of smartphones. It was not clear on what digital devices were being used to learn digital skills, strategies teachers used to teach digital literacy and to enhance learning involving the visually impaired, a situation the present study sought to explore in Zambia.

In a study conducted by Karthiyayeni & Bengaluru (2014) on learners with visual impairment and acquisition of computing technical skills in India, it was reported that learners were often not conversant with use of assistive devices which had implications on their ability to learn digital literacy skills. For example, learners with visual impairment (LwVI) were not familiar with the operations of the hardware and the application of software to their academic work. This could be true with the Zambian learners with visual impairment. Karthiyayeni & Bengaluru (2014) also revealed that a significant number of visually challenged individuals with visual impairment, felt uncomfortable when asked to utilize desktop and laptop computers, but were quite free when required to use braille equipment to process to their learning tasks, sign of inadequate digital skills.

These findings were supported by those of Abhishek and Tripathi (2024), who examined the application of digital knowledge to learning involving learners with visual impairments in elementary schools in India. The study revealed that it had the potential to promote academic inclusivity and participation among LwVI in India. In a study conducted by Mulauzi, Walubita and Pumulo (2019) on the application of ICT skills to higher education learning in Zambia, it was found that learners with disabilities had less computer technical knowledge and did not show proficiency in the application of literacy skills to their academic work. Her study revealed that learners with disabilities were limited or struggled in using online research skills to search the internet for information to support learning tasks due to inadequate digital skills, a situation that might be true for leaners with visual impairment in Zambian secondary schools, as well.

In a study conducted by Ofori-Atta, Teye, and Awini (2023) on how teachers approached the teaching of digital literacy to learners with disabilities, it was found that teaching digital literacy called for the use of a variety of approaches. The study, for example, echoed the use of integrating digital literacy skills across subjects; provided more hands-on activities, increased use of real-world scenarios and, where possible, teachers emphasized the use of critical thinking while at the same time ensuring online safety for the students. Aljarallah & Dutta (2024) explain curriculum integration in the teaching of digital literacy as the idea of infusing digital literacy into other academic subjects, such as English language, mathematics and science. Teye (2014) reported learners being made to know how to set up digital devices, how to do simple typing, prepare and edit simple documents, and how take short notes using a computer or smartphones. It is however, not clear what learners in Zambia were being exposed to in the context of digital literacy education. Chileshe, Penda, and Kasonde (2025) also

reported that teachers' use of hands-on activities and project-based learning in teaching developmental digital literacy skills helped learners to quickly acquire necessary digital skills.

In a similar study, by Siakalima (2021), it was observed that the use of practical activities like research projects, creating digital presentations and coding, gave students a more directed experience in the learning of practical-based subjects such as those in digital literacy. Chipili (2021) also posits that teachers use demonstrations and practical activities to teach learners with visual impairment, how to use MS Word, Excel, and PowerPoint processors on different kinds of text and mathematical documents. LwVI are taught how to create soft copy folders, sub-folders and how to manage different file folders in different locations on the computer, work on the internet through demonstrations and practice. Aljarallah & Dutta (2024) observed that the provision of real-world scenarios through the creation of simulations and social media posts helped to stimulate the desire to learn digital literacy skills. It was reported that, learners were made to, learn how to identify phishing emails and help students with disabilities apply skills to everyday situations. This view was equally supported by Ofori-Atta, Teye, & Awini (2023 who felt that creation, simulation and use of social media posts, provided students with more opportunities to learn, analyse and evaluate online information. It was easy to identify biasness and build the capacity to question sources of digital information, building critical thinking skills when learners were effectively exposed digital literacy education. The present study, however, sought to explore approaches and techniques teachers used in the teaching of digital literacy to learners with visual impairment in the Zambian secondary schools.

In another study, Kamali and Gul (2022) studied challenges encountered in teaching digital literacy skills to students in university settings. In the study, a sequential mixed-method analysis approach was used. It was reported that although students had basic Digital literacy skills such as accessing digital information, creating files, and retrieving information, they still lacked knowledge of digital technical skills and proficiency in accessing and processing digital information, they were not quite competent with the management of digital information, and creation of digital content, a situation which might be true for Zambian learners. Chipili (2017) attributes such a situation to; inadequacies in students' digital skills, teachers' ill-preparedness, limitations in digital resources and digital infrastructure which in a way might have affected learners ability to learn digital skills. Patel (2023) posits a lack of proficiency among learners in word processing and the use of MS and Excel, and concludes that their failure might have being due limited skills in teaching ICT which similarly led learners inability to learn such skils. This could be the case for learners with visual impairments in the Zambian secondary school system.

In addition, Patel (2023) found that students were more comfortable using smartphones than other digital devices, such as phones, desktops, and laptop computers. It was found that while the majority of the participants had smartphone operation skills,

few were able to demonstrate proficiency skills in operating other digital devices, such as desktop and laptop. Very few learners were found to have sufficient knowledge and skills to use other digital devices for audio editing or PowerPoint creation. Wambugu and Mugo (2020) attributed the inability of students to function in a digital environment to a lack of access to appropriate technology and resources, a shortage of teachers with specialized training and the need for universally accessible and inclusive curriculum design. Based on the findings of Wambugu and Mugo (2020), LwVI in Zambia might be experiencing similar challenges, hence the need for the present investigation to inform policy and practice.

6. Material and Methods

In this study, constructivism was used as a research philosophy. This was supported by interpretivism as a paradigm. The research design used was a descriptive case study supported by qualitative approaches. The research design was chosen because of its ability to provide a detailed and in-depth understanding of the phenomenon, learning of digital literacy skills and visual impairment. The design seemed to be flexible in data collection methods, cost-effective and able to contribute towards theorisation based on emerging new knowledge (Smith *et al.*, 2022). The descriptive case study research design used was chosen on the basis that it had the ability to enable a researcher to construct and interpret the unspoken, unconscious words of participants to get the hidden meaning involving the phenomenon under study in digital literacy education vs visual impairment (Patton, 2012).

The ontological and epistemological view in the study was adopted to show that the nature of reality was subjective, socially constructed and only understood by examining the perceptions of the human actors themselves, such as teachers and LwVI involved in the teaching and learning of digital literacy education (Creswell, 2014). For this reason, reality was understood from multiple perspectives, and it was holistic and contextual in form to support this kind of study (Braun and Clarke, 2021). The study was aligned to a growing body of researchers' work on digital literacy vs visual impairment, arguing against positivism, pointing out that the social science and how it deals with action and behaviour can be generated within the human mind, hence, cannot be studied externally, which requires interaction with the informants themselves as perceived by Simui (2018).

The sample was 12 (3 special education teachers and 9 LwVI). The participants included male and female teachers and learners. Teacher-participants were coded as TRLwVI, while learners were given the code LwVI to identify participants' "voices" in the study. The sample was determined using the saturation point, i.e., a stage in qualitative data collection where no new or relevant information emerges (Creswell, 2018). In such a situation, the data collection process indicates that sufficient data have been gathered to understand and interpret themes and patterns (Creswell, 2014). In the

present study, the participants were selected using a non-probability, homogeneous, purposive sampling procedure. The study used in-depth interview guides and an observation checklist to collect the data. The qualitative data collected were analysed using thematic data analysis approaches. This resulted in categorizing and theming of coded information for interpretation. The findings of the study were then presented descriptively.

7. Findings

In this section, we presented the findings of the study, which were on teaching and learning of digital literacy and computer technical skills by Learners with Visual Impairment (LwVI). The study was conducted in selected secondary schools offering education to learners with visual impairment in the Ndola district of the Copperbelt province of Zambia. It was from November 2024 to July 2025. The findings are presented according to emerging themes and subthemes guided by the set objectives.

7.1 Types of Digital Literacy Skills Taught to LwVI

The first objective was to explore the types of digital literacy skills being offered to LwVI in Zambia. The researchers interviewed nine (9) LwVI and three (3) special education teachers who shared views on the type of digital literacy skills learnt by visually impaired learners. In response to the question on the type of digital literacy skills being taught to LwVI, participants gave several responses, which led to the identification of themes and subthemes as indicated in Table 1 below:

Table 1: Digital Literacy Skills Taught in Schools

Emerging Themes	Subthemes
Basic digital knowledge	• Identify digital devices • Naming, parts of digital devices • Use of identified digital devices
Inputting and navigation skills	• Keyboard navigation • Touch typing • Typing • Use of shortcut keys
Basics word processing skills	• Creating texts • Editing texts • Formatting texts • Saving text, documents
Software, application skills	• Operating software systems • Web browsers (ie Google, Chrome and Firefox) • Productivity suites (Microsoft Office ie Word, Excel, and PowerPoint processors) • Digital content tools • Document formatting tools
Internet and	• Access information via emails • Communication via emails

communication skills	• Internet browsing • Use of Google Chrome • Composing and sending emails
New technological and innovation, skills	• Braille displays software • Screen reading software • Text-to-speech system • Use of optical character Recognition (OCR) • Use of AI • Large print material technologies

7.1.1 Basic Digital Knowledge

One of the emerging themes on the first objective was that of LwVI being exposed to basic digital knowledge as they proceed to more advanced digital literacy skills. The findings revealed that LwVI were made to start with the identification of various digital devices, their components and how they work. This was followed by learning how to turn on the digital devices, how to search for information on the internet, how to create and share digital content, how to conduct research using the internet, and how to evaluate online information, besides ensuring the safety of information as part of cybersecurity. These findings were supported by a female learner-participant, LwVI-8, who had this to say;

> **Excerpt 1:**
> "*…we started by first learning the names of different digital devices, their parts, saying how each part – phones, desk computer, laptop and how they work. It was easy to follow because we were seeing and touching each device, and seeing how each part worked."* (02/07/2025)

Another learner, male LwVI-2, provided the following sentiments during the interview:

> **Excerpt 2:**
> *"I liked the way out, the teacher introduced us to each part of the phone, computer and laptop, we were made to feel it, see how it worked, before we were able to use it ourselves."* (22/06/2025)

Female learner-participant, LwVI- 4, also added:

> **Excerpt 3:**
> *"We learn keyboard navigation and typing to help us use a computer or a laptop more effectively, even without a mouse."* (02/07/2025)

Based on these findings, it was clear that LwVI started with the basics of digital devices in their digital literacy learning. It found that learners were made to identify

different types of digital devices, learn about their components and how they worked, and settle down to learn curriculum-based digital literacy skills.

7.1.2 Inputting and Navigation Skills

Another theme that emerged on the first objective was the introduction of LwVI to inputting and navigating skills. The LwVI reported that once learners had learnt the different parts of digital devices, they were taught how to input basic information using keys on the keyboard, how to use the CPU and monitor, and how to use the braille display. They also learnt how the operating systems of phones, laptops, and computers work. This was followed by learners learning how to navigate using specific components of the digital devices. In support of these findings, one female teacher, TRLwVI 1, had this to say:

> **Excerpt 4:**
> *"We teach them fundamental computing. They learn how to input and navigate as they learn basic concepts. Understanding how phones, laptops, and computers work and how their different components are used made the teacher's approach so simple. The basis of understanding of computer technology is aimed at enabling them to navigate and utilise digital devices with simplicity."* (04/07/2025)

Arising from these findings, it was evident that LwVI, upon gaining understanding of the various digital devices, found it easier to learn digital literacy skills, such as putting information. They equally learnt how to navigate various sections of digital devices and, with time, showed signs of mastery in fundamental computing despite their disability.

7.1.3 Basics of Word Processing Skills

Another theme that emerged regarding the type of digital literacy skills taught to LwVI in the study schools was skills associated with basic word processing. It was found that LwVI were taught, for example, how to use a digital device to create texts, how to edit texts, format texts and save on their digital devices, texts and documents in a soft format, showing progress in their word processing skills. In support of these findings, one male learner, LwVI-5, noted:

> **Excerpt 5:**
> "*I now know how to use shortcut keys to type, edit, and format documents in word processors like Microsoft Word. Additionally, file management techniques are taught, such as how to store, retrieve, rename, and arrange files into folders."* (15/06/2025)

Another male learner, LwVI-7, observed:

Excerpt 6:

"Since I can't rely on a mouse, my school is teaching me how to use the keyboard efficiently through touch typing. I have also learned how to access information and navigate the computer using screen readers like NVDA and JAWS." (16/07/2025)

Arising from the above findings, it was clear that as LwVI learnt digital literacy skills, they were also exposed to skills for processing words on their digital devices. Word processing skills learnt included: creating, editing, formatting, and saving texts and documents in a soft format. It was also clear that LwVI were introduced to navigating using screen readers, particularly with software such as NVDA and JAWS.

7.1.4 Software, Application Skills

It was also found that learners with visual impairment (LwVI) were taught how to use various software as part of digital literacy skills. For example, they were exposed to how to operate software systems and use different windows and web browsers, such as Google Chrome and Firefox, as they progressed to higher digital literacy skills to support their academic work. Additionally, learners are exposed to productivity suites such as the Microsoft Office suite, like those containing Word, Excel and PowerPoint and have digital content creation tools, as was evidenced in the contribution of one male LwVI-4 reported:

Excerpt 7:

"We learn basic computer skills for self-reliance. In addition, other software-related skills such as typing, using screen reader software, completing basic computer tasks, using word processing software, navigating websites and the internet, using email and other communication tools." (08/07/2025)

A male teacher, TRLwVI-3, also added:

E**xcerpt 8:**

"We teach them how to access digital content via audio output by using screen readers like JAWS and NVDA… They now know how to use shortcut keys to type, edit, and format documents in word processors like Microsoft Word." (04/07/2025)

Based on the findings cited above, LwVI were taught how to use operating systems and web browsers such as Windows, Google Chrome and Firefox. They were further introduced to productivity suites on digital devices, such as the Microsoft Office suite, which made them increasingly functional as they learnt and applied digital literacy skills.

7.1.5 Internet and Communication Skills

To establish the internet and communication skills taught to learners with visual impairments (LwVI), participants were asked to share some of the skills they felt were being offered to them during digital literacy lessons. In response to the questions, it was reported that learners were learning skills such as accessing information via email, communicating via email, internet browsing, and using Google Chrome to support their use of screen readers to source information on the internet. It was further observed that LwVI were taught how to compose and send emails as part of internet communication activities. These findings were supported by one female teacher, TRLwVI- 2, who had this to say:

> **Excerpt 9:**
> *"We expose LwVI to use Google Chrome that supports screen reader commands, besides teaching them how to compose, send, and reply to emails using the internet."* (27/06/2025)

A male, LwVI-9, also added:

> **Excerpt 10:**
> *"We can read, write, browse the internet, and communicate with digital devices because of screen readers. In order to become computer literate, we are taught these skills."* (24/07/2025)

In short, LwVI were being exposed to skills for composing and sending emails and using the internet productively to communicate with others. Teachers believed that internet communication skills were necessary for learners, and each learner needed to acquire them.

7.1.6 New Technological and Innovation, Skills

Regarding whether LwVI were learning additional skills in computing, it was found that they were being exposed to additional skills to help them appreciate the emerging technologies and innovations in the learning of learners with visual impairment. It was found that LwVI were taught how to use: braille displays, screen reading software, text-to-speech systems, Optical Character Recognition (OCR), AI tools, and large print materials. In support of these findings, one male teacher-participant, TRLwVI- 4, observed:

> **Excerpt 11:**
> *"We teach them how to access information and navigate the screen-reading software, like NVDA and JAWS, and how to use the text-to-speech system. Their understanding of these emerging technologies helps with processing skills like typing, editing, and document saving."* (8/07/2025)

A female, LwVI-8, also noted:

Excerpt 12:
"We are being taught new technologies unlike in past. Our teacher, for example, has taught us how to use Braille displays on the computer, how to use Optical Character Recognition (OCR), the use of AI, as well as large print material technologies, which are necessary in the use of digital devices." (05/07/2025)

In sum, it was evident that learners were receiving additional skills rather than the skills required to appreciate and apply to new technologies emerging in the use of digital literacy in the education of the visually impaired learners in the school system.

7.2 Computer-Based Technical Skills Taught to LwVI

Regarding whether participants were taught or exposed to computer-based technical skills as they learnt digital literacy, the study revealed that 9 out of 12 participants held the view that teachers went beyond digital literacy education. LwVI were further exposed to computer-based technical skills to support and cement acquired digital literacy skills. LwVI aimed to equip them with technical skills to use digital office products productively and to perform advanced tasks in programming and cybersecurity on their digital devices.

Additionally, it was revealed that learners were taught with a view to them gaining software proficiency, ie Microsoft Office, Google Workspace, and specific coding language. It was also found that the learners were exposed to hardware knowledge systems (CPU, RAM, storage drives), input devices using keyboard, mouse and output devices (monitor, printer). The technical skills taught included: specialized fields such as graphic designing, data analysis and basic network administration, such as setting up systems, maintaining, and securing computer networks. The table below shows emerging themes and subthemes to support the findings outlined above:

Table 2: Computer-Based Technical Skills Taught to LWVI

Emerging Themes	Sub-themes
Software proficiency	• software understanding • use of Microsoft Office • use of Google Workspace • specific coding language • hardware operating systems
Hardware knowledge systems	• Physical components of digital devices • Central processing unit (CPU) • Random Access Memory (RAM) • Storage drives • Input devices (keyboard, mouse • Output devices (monitor, printer)
Knowledge of	• Screen readers • Accessibility tools

assistive tools	• Assistive software • Audio output
Skills in specialized fields	• Braille technologies • Graphic designing • Data analysis • Basic network administration • NVDA And JAWS

7.2.1 Software Proficiency

With regards to the software proficiency among LwVI, 9 out 12 participants felt learners were not competent enough in using available software, especially those associated with the digital education of the visually impaired, while the remaining 2 out of 9 felt they had challenges in using software in their academic work. Participant teachers reported that although they gave LwVI sufficient practice to facilitate proficiency in the use of specialized digital software, most learners 6 out of 9) had challenges in gaining mastery in the use of such software. Where learners were found to have gained some proficiency, it was observed that teachers used, in most cases, one-to-one approaches to teaching LwVI. Such approaches enabled LwVI to understand software operations and apply acquired skills in the use of various software. For example, learners were taught how to use Google Workspace and apply specific coding language as they learnt how to use the specific software, as was evident in one male learner, LwVI-5, views:

> **Excerpt 12:**
> *"We are always guided on how to work with software and associated tools such as Zoom, Microsoft Teams, and Google Workspace. meet not only that we are taught how to do audio recording and learn how to use editing software."* (2/07/2025)

One female teacher, TRLwVI- 1, added:

> **Excerpt 13:**
> *"We also teach magnification techniques to our friends who have low vision. Zoom text, Magic, Supernova, Apple Zoom, Chrome magnifier, and Android magnification are a few examples of magnifiers that are used."* (06/07/2025)

It can be seen from the learners' and teachers' reactions that most of the LwVI are exposed to software, although they may not have attained the required proficiency. However, with time and practice, they were likely to build up skills in the use of software, especially those associated with learning LwVI. Learners, in particular, are made to have a clear understanding of software operations and acquire knowledge on how to use specific software and related applications. Learners learnt how to use Google Workspace and a specific coding language, which involved more advanced digital literacy skills.

7.2.2 Hardware Knowledge of Systems

Another theme that emerged on the teaching of technical digital skills was the exposure of LwVI to hardware knowledge of systems. LwVI were taught and equipped with knowledge on technical operation systems of the digital devices, for example, learnt the physical components of digital devices and their functions. These included: the Central Processing Unit (CPU), Random Access Memory (RAM), how to use input Devices such as keyboard, mouse and Output Devices like monitor and printer. In agreement with these findings on learners' knowledge of hard knowledge systems, one male teacher, TRLwVI-3, shared:

> **Excerpt 14:**
> "*In my class, I teach LwVI … the main components of basic computer and their functions. The lessons focus on building hardware knowledge… understanding the physical parts of a digital device, such as the CPU, memory (RAM), storage devices, peripherals, and software knowledge, of operating systems, applications, and programming languages.*" (09/07/2025)

A female learner, LwVI- 9, added:

> **Excerpt 15:**
> *"We are taught, for example, computer components and functions like CPU, monitor, keyboard, storage devices, and generally about software knowledge. besides the use of Microsoft Word, Excel, PowerPoint and Screen readers, though difficult to understand, we try.* (07/07/2025)

Through digital literacy lessons, LwVI acquire and build up their hardware knowledge on operating systems. They are exposed to knowledge of the inner and outer physical structures of digital devices, such as the Central Processing Unit (CPU) and Random Access Memory (RAM). The findings showed that LwVI were taught on inputting using keyboard, mouse and output devices through the use of a monitor and a printer as part of digital literacy education.

7.2.3 Knowledge of Assistive Tools

In order to establish learners' knowledge of the assistive tools available to acquire digital technical skills, it was found that learners were introduced to and continued to practice the use of assistive technologies. For example, they were introduced to the use of screen readers, the use of accessibility tools and applications of assistive software. They were taught how to use audio output, NVDA and JAWS as part of the assistive technologies they needed to be familiar with. The teacher believed that LwVI needed knowledge of support tools to effectively gain mastery in digital activities, as acknowledged by one male learner, LwVI-5, said:

Excerpt 16:
"We have learned how to use screen readers like JAWS, NVDA, and VoiceOver as assistive technologies, and these skills have helped me to improve my academic work since I am able to access more information on study materials." (05/07/2025)

A male learner, LwVI-3, acknowledged:

Excerpt 17:
"We learn about physical components of a computer, such as the CPU, memory, storage devices, peripherals and know about different types of software, including operating systems, applications, and programming languages." (03/07/2025)

One teacher, TRLwVI-4, also observed:

Excerpt 18:
"Learners are taught how to use screen readers like JAWS, NVDA and how to use VoiceOver as additional assistive technology. We are taught magnification techniques which help us with low vision. Additional skills taught include: zooming text, use of Magic screening readers, Supernova, Apple Zoom, and Android." (05/07/2025)

In sum, participants felt that teachers did offer sufficient knowledge on assistive tools, although they, as LwVI, struggled a lot to gain the required skills to make them functional in digital literacy education. The study identified skills associated with the use of screen readers, accessibility tools, assistive software, audio output, NVDA and JAWS as some of the assistive skills teachers taught to LwVI in the study schools.

7.2.4 Skills in Specialized Fields

Another theme that emerged was that of LwVI being introduced to more specialized skills for them to operate comfortably in specialized digital fields, such as graphic designing, braille technologies, data analysis and basic network administration. Learners are exposed to relevant specialized skills to enable them to operate, although not quite competent in new technologies, as acknowledged by one male learner, LwVI-5, who said:

Excerpt 19:
"We are also taught graphic designing and use of braille technologies. For example, how to design certain things, use braille note takers and refreshable displays using computers and smartphones." (05/07/2025)

A male LwVI-8 observed:

Excerpt 20:

"Using assistive technology, such as screen readers, we can use spreadsheets, word processing, database management, presentation software, and the internet, communication, multimedia, and teamwork software. We need appropriate skills. Teachers strive to teach us these skills, although movement needs to be done for us to gain competency to be able to function in more specialized fields of digital literacy." (05/07/2025)

In short, learners learn beyond basic digital literacy skills with a view to making them function in specialized fields of digital technologies. They are exposed to skills to support performance in graphic designing, applications of braille technologies, collection and analysis of digital data and performing basic network administration. These include: setting up systems, maintaining systems, and securing computer networks as they operate on digital platforms.

7.3 Challenges in Teaching Digital Literacy to LwVI

On the issue of challenges, if any were encountered in the teaching and learning of digital literacy involving LwVI, several themes emerged through the views expressed by teachers and learners. Participants, for example, acknowledged encountering challenges including inadequacies of assistive technologies, limited accessibility of digital services, preparation of teachers for teaching digital literacy and digital infrastructure-related challenges as evidenced in Table 3 below:

Table 3: Challenges in Teaching / Learning of Digital Literacy Involving LwVI

Emerge themes	Sub-themes
Inadequacies assistive technologies	• High cost of assistive technologies • Lack of awareness of available and use of assistive technologies • Outdated technologies • Insufficient braille displays • Limited screen readers, magnifying software, tactile keyboards, • Low digital literacy
Limited access to digital devices	• Poor access to computer labs • Limited and shared resources • Poor internet connectivity • Lack of an integrated school curriculum on technologies
Inadequate teaching skills to support ICT education	• Limited digital literacy teaching skills • Poor attitudes of teachers towards digital literacy education • Lack of confidence in digital literacy work -teachers and learners • Lack of specialization in learning of LwVI • Insufficient technical and administrative support
Digital infrastructural challenges	• Limited internet connectivity • Lack of access to devices • Unreliable electricity • Existence of digital divide -some have access, others do not

7.3.1 Inadequacies of Assistive Technologies

One of the themes that emerged regarding the challenges teachers and LwVI faced in the teaching and learning of digital literacy skills was the inadequacies in assistive technologies to support the acquisition of digital literacy skills. The study revealed that LwVI encountered challenges like: high cost of assistive technologies; lack of awareness of available assistive technologies, outdated digital technologies, insufficient braille displays, limited screen readers, inadequate magnifying software and limited tactile keyboards, which resulted in low digital literacy uptake. These findings were supported by sentiments shared by some of the teachers and LwVI, as indicated by one female learner, LwVI-8, who noted:

> **Excerpt 21:**
> *"In our school, we do not have sufficient assistive technology and tools, thus we are forced to share the limited resources. This affects the rate at which we are able to uptake digital literacy skills. The school should surely do the same thing in my view. For example, shortages in screen readers, braille displays, magnification software, and no digital books affect the way we learn digital literacy in my view."* (05/07/2025)

Another male learner, LwVI-7, observed:

> **Excerpt 22:**
> *"Shortages of assistive technologies are a hindrance because they can slow down the process of learning computer literacy skills."* (16/07/2025)

Another male learner, LwVI-5, posted:

> **Excerpt 23:**
> *"Using outdated tools like old Perkins brailler, outdated screen readers makes my learning slow. When my friends finish their work quickly, I sometimes remain behind."* (05/07/2025)

It was evident from the study that 10 out of 12 teacher and learner participants felt that there were challenges in the learning of digital literacy skills in the case of LwVI. The study cited: inadequacies in assistive technologies; high cost assistive technologies; presence of outdated technologies in special education practice, insufficient braille displays, limited screen readers, magnifying software, and difficulties in use of current tactile keyboards. All these contributed to slowed progress in accessing digital literacy skills among LwVI in the study schools.

7.3.2 Limited Access to Digital Devices

With regards to access to digital devices by LwVI, it was found that learners were striving to develop digital literacy skills, because of limited access to digital devices, 10 out of 12, while two (2) were not sure. Teachers and learner-participants reported having problems accessing devices such as computers; however, they were able to access them for a limited time. They were also forced to share resources with several learners, thereby affecting the pace of learning digital literacy skills. Further, the study noted the poor internet connectivity as well as the lack of an integrated technology approach in curriculum delivery, which impaired the learning of digital skills among LwVI. As shared by one female-teacher participant, TRLwVI-2 said:

> **Excerpt 24:**
> "*Sometimes computers and software are outdated and in short supply. Learners are made to share the limited resources, and you know how computer literacy is; if one does not practice often, it becomes difficult to master digital literacy skills."* (07/07/2025)

A male learner, LwVI-3, also shared:

> **Excerpt 25:**
> *"It has become challenging to develop the right skills required in the use of assistive technologies. Tools are quite limited, and I find myself depending on my friends to gain access to the internet."* (03/07/2025)

From the findings above on access to digital devices, it was clear that LwVI faced challenges ranging from limited access to digital devices, limited learning time, inadequate resources, poor internet connectivity, and, indeed, a lack of an integrated school curriculum to support practice.

7.3.3 Inadequate Teaching Skills to Support ICT Education

One of the participants said she had not started learning digital literacy education, and the school has had no teacher to teach the subject. This view implied that some of the teachers did not have the relevant digital skills to teach digital literacy education, especially LwVI. The study revealed that teachers had limited digital literacy teaching skills and lacked confidence in teaching digital literacy as a subject. It was also found that teachers did not have specialized knowledge on the education of LwVI, thus finding it difficult to support such learners to learn digital skills. Further, the study noted, schools' failure to provide technical and administrative support to teachers and learners in learning digital literacy skills, as was observed by one male learner participant, LwVI- 3, who reported:

Excerpt 26:
"What really happens is that teachers hardly pay attention during our learning of computers. They seem to have no interest at all in the subject. Some of them are hardly aware of what we should learn, resources required, or even how to adapt the work to suit our learning needs." (03/07/2025)

TRLwVI- 1, a male teacher, added:

Excerpt 27:
"Some of my teachers lack confidence and support in teaching computer literacy skills. I am always left out of the computer lesson. I feel discouraged and have lost self-esteem. As a result, I always remain behind. My friends who are good at the subject learn more while I struggle to move on." (02/07/2025)

A male learner, LwVI–6, noted:

Excerpt 28:
"When I come across a teacher who does not know how to use screen readers such as JAWS and NVDA, and others, I can't get anything done in a lesson. I feel like I get lost and depend on others to operate the computer." (06/07/2025)

Participants felt that there were some challenges in the teaching and learning of digital literacy among LwVI. The study cited: ill-preparation of teachers for digital literacy education, lack of confidence in teaching and receiving digital literacy instructions, inadequate knowledge on how LwVI actually learn, and insufficient technical and administrative support to make LwVI learn digital literacy skills. All these challenges limited the benefits accrued to LwVI in the implementation of the school curriculum.

7.3.4 Digital Infrastructural Challenges

Participants were asked about the availability of the digital infrastructure to support the teaching and learning of LwVI. The teacher and learners gave several responses to the question. On the whole, it was found that several digital infrastructural challenges existed in the study schools. The challenges cited were: limited internet connectivity, not having enough time to practice, lack of access to digital devices, unreliable electricity and the existence of digital divide - a situation where some learners had reasonable access to digital skills within their schools, while others did not have such provisions. In support of these findings, one male learner, LwVI-2, observed;

Excerpt 29:
"The computer lab at my school is very overcrowded and has poor internet connectivity, and it's not in a good place for me to navigate safely. Because of this reason, it becomes very difficult for me to learn software and screen readers, I feel left behind because of the kind of facilities in the school." (27/06/2025)

A male learner, LwVI-1, also shared:

Excerpt 30:
"*Without enough time in the laboratory, I mostly miss out important skills like typing, browsing the internet and the use of assistive tools, which makes me dependent on other people instead of working on my own."* (04/07/2025)

LwVI-9, a female learner, observed:

Excerpt 31:
"What really happens is that when the hardware and materials are in short supply and not adapted to my needs. I am always left out in learning computer literacy skills. I really waste time struggling with tools which cannot support me." (24/07/2025)

It can be seen from the teachers' and LwVI's reactions that some schools encountered several challenges in delivering the digital literacy school curriculum. Challenges encountered ranged from poor internet connectivity, limited time for digital literacy practical laboratory work, digital devices were in short supply, unreliable electricity supply, to the digital divide among learners in the study schools.

8. Discussion

8.1 Type of Digital Literacy Skills

In this section, we discuss the findings on first objective which was on types of digital literacy skills learners with visual impairment (LwVI) we being taught in the study schools. It was revealed that LwVI were being exposed to several digital literacy skills in the course of their classroom practice.

It was found that learners with visual impairment (LwVI), were introduced to different parts of the computer as a way of giving them basic digital knowledge. Through the acquisition of digital knowledge, LwVI were prepared for more advanced digital work. The study revealed that teachers started with learners identifying digital devices, studying various components and explaining how each part of the device worked before being made to settle down to learning specific digital literacy, such as turning on a computer and searching the internet. Additionally, they were introduced to more advanced abilities such as creation and sharing digital content, conducting research,

evaluating online information and introduced to online safety and cybersecurity. These findings agreed with those of Teye (2023) and Kamali & Gul (2022), who believed that acquiring basic computer knowledge was essential in children's learning of digital skills. Teaching of digital literacy formed a foundation for children's future acquisition and development of digital literacy skills. It helped to ease the learning of more advanced digital literacy and technical computer skills. A comprehensive study of this nature, therefore, became necessary in order to establish the nature of digital literacy skills taught to LwVI and the role played by teachers in the learning as such learners strived to acquire digital knowledge, necessary in ultization of digital literacy in their academic work.

Regarding learners, the study revealed that once LwVI gained knowledge of the various components of digital devices and how they worked, they were taught how to input information and navigate. Learners learnt how to type, edit and save information on the digital devices. It was found that these findings were in line with Haneefa & Syamali (2014) and Chipili (2017), who post that basic knowledge of fundamental concepts, typing, and how to use hardware, as well as software knowledge, made it possible for learners to learn how to input and navigate various digital literacy devices. Learners, for example, were able to apply skills as they explored the internet and practsed digital communication. As a result, LwVI felt emotionally supported and had a sense of belonging as they learnt to input and navigate various digital tools. The constant reassurance that, as learners, they were not alone, teachers were with them, on their journey as they learnt digital literacy skills and improved access to digital information in support of academic work, was enough to make strive to acquire the skills.

With regards to basic word processing skills**,** it was evident that LwVI were taught how to process words on their digital devices. The skills taught included; creating, editing, formatting, and saving texts and documents. As they learnt these skills, LwVI strengthened their inputting and navigation skills and were able to use screen readers, including NVDA and JAWS, to process their academic work. These findings were in agreement with those of Kamali & Gul (2022), who observed that greater digital competency arises from once-strong digital processing skills. The more learners were exposed to word processing skills, the more they developed a desire to learn various computer skills and functions. According to ZANEC's (2021) report, children under the age of 18 are less exposed to digital devices in Zambia, had the potential of slowing their ability to acquire skills and process digital information. The present study, therefore, sees early exposure to digital literacy skills as having the potential to help learners, including those with visual impairments, develop the capacity to use, appreciate and apply digital skills in advanced academic work effectively.

8.2 Computer-Based Technical Skills Taught to LwVI

Regarding the computer-based technical skills learners were exposed to, they were required to acquire knowledge and proficiency in using digital hardware and software. They were taught how to use Microsoft Office and Google Workspace, and to apply

specific coding languages as they process information digitally. Additionally, the study revealed that LwVI were taught how to use hardware systems such as the CPU, RAM, and storage drives. They were also made to learn how to use a keyboard, a mouse, and output devices, a monitor, and a printer. In line with studies by Arslantas & Gul (2022) and Patel (2023), it was found that when learners acquired sufficient technical knowledge of the digital devices they were required to use. It id therefore, easy for them to learn other digital and technical skills. The study, for example, cited learners' exposure to knowledge of CPUs, RAM, and storage drives, which were necessary for their advanced digital work. With such skills, it was possible to access the digital school curriculum In fact, digital skills helped to enhance academic advancement by enabling them to access and use digital information to support their academic work. In short, the study showed that the acquisition and development of digital technical skills , helped to cement their digital literacy skills.

In the present study, it was equally found that LwVI were exposed to skills necessary for use in specialized fields in computer studies. They were, for example, taught graphic design, data analysis and basic network administration. These involved: setting up the system, maintaining digital systems, and securing the computer network to ensure it runs efficiently, reliable and free of cybersecurity issues. These findings align with the UN (2020), which stresses the early acquisition of computer literacy and where possible and practical, technical skills by every child. This has the potential of making the world fairer, more accessible, and just for everybody. The UN (2020) report believes that digital advances have the potential to support and accelerate the academic achievements of learners with diverse learning needs, including those with visual impairment. The report, however, does highlight implications of exposure to digital literacy, including adverse effects on human rights and human agency. Such concerns, therefore, call for governments to keep in mind how they harness and manage new technologies as they expose children including those with visual impairment more advanced digital world.

8.3 Challenges in Teaching Digital Literacy to LwVI

The study indicated that LwVI faced several challenges in learning digital literacy skills. It was evident from the study, that teachers and learners often experienced inadequacies in assistive technologies, had limited access to digital services, teachers were not competent in digital literacy instruction, and they frequently faced digital infrastructure-related challenges. Due to inadequate assistive technologies, participants reported challenges stemming from limited investment in hardware and software, including braille displays, voice-over tools, and screen readers. Because of these challenges, learners' ability to learn digital literacy and technical skills was negatively impacted, in turn affecting their school success. These findings were in agreement with those of Ciarli, Kenney, Massini, and Pisccitello (2021), who felt that learning digital literacy skills depended heavily on staff know-how in using assistive technologies and their ability to impart digital knowledge and skills to their learners.

In his study, Olmstead (2025) observed that successful school learning investments in the context of special education are those that provide assistive technologies and, in the process, empower learners who are least able to access information to support academic experiences. Olmstead (2025), however, acknowledges substantial challenges, including those associated with the executive gap such presence of informed digital literacy policies. The study cites inadequacies in assistive technologies, teachers' unpreparedness and poor digital infrastructure as challenges affecting the ability to learn and develop digital literacy and technical skills by learners, including those with LwVI. In the present study, many LwVI participants stated that they struggled to access and use assistive technologies in their learning of digital literacy. They attributed this situation to factors such as; schools having less-trained staff, being under-resourced, lacking experienced in digital teaching, electricity outages, which greatlt impeded the learning process.

With regards to infrastructure-related challenges, participants in the study had problems of limited internet connectivity, learner-unfriendly school digital curriculum and poor digital laboratories. The situation was further compounded by limited access to digital devices, unreliable electricity supply and the existence of a digital divide among LwVI, that is, while some LwVI had prior knowledge about the use of certain digital devices, others did not know at all, making it quite challenging to teach digital literacy to groups of learners with such a divide in the same class. These findings agree with those of ZANEC (2022), which reported limited access to electricity and computers, a shortage of ICT instructors, and unequal access to digital information in Zambian primary schools. Based on the findings of the present study, this negatively impacted on the ability of LwVI to acquire and effectively utilize digital literacy skills in the study schools.

In the same vein, Siakalima (2021) posts challenges in Zambia's effort to teach digital literacy to young learners in primary schools. These ranged from; high investment costs, limited digital skills among instructors, and there are very few qualified ICT educators to support digital literacy education in Zambia. The present study howver, notes the challenges of data security and privacy, poor connectivity and increased power outages, which has affected the delivery of digital literacy lessons especially to LwVI. In short, these challenges experienced in the study schools had significantly affected the LwVI's ability to acquire, develop and apply digital literacy to their academic thereby bearing negatively on their academic learning outcomes in the study schools.

9. Conclusion

The Study aimed to explore the learning, acquisition, and development of digital literacy and computer-based technical skills involving learners with visual impairment (LwVI) in Zambian secondary schools. It was evident that LwVI were being exposed to digital literacy education by learning basic digital knowledge and skills such as inputting and navigating digital devices. The Skills learnt included: desktop computers, laptops and

phones. It was also found that LwVI were being introduced to computer-based technical skills as part of capacity building in LwVI. Among the technical skills learnt were how to use hardware knowledge systems like CPU, RAM, and storage drives, and how to use input devices, for example, keyboards, mouse, monitors, and printers.

The study also explored the challenges and opportunities in the learning of digital skills by LwVI. It was evident from the study that there were several digital literacy-related problems encountered, such as under-resourced implementation of school digital curriculum; insufficient internet infrastructure, limited learning time, poor internet access and frequent electricity outage. These had negatively impacted on the learning of digital literacy skills involving LwVI in the study schools. Despite these challenges, some study schools however, still provided learners with sufficient support in the learning in of digital literacy and basic technique skills. LwVI however, were very thankful for whatever material and technical support schools provided for them to learn, acquire and develop digital literacy to ease their own learning in the study schools in Zambia.

10. Recommendations

1) Schools should encourage the use of teaching strategies which are more inclusive, sustainable and able to differentiate digital literacy skills, instead of the current one-size-fits-all strategies being employed in teaching and learning of digital literacy skills involving LwVI in study schools.
2) Since mobile phones are the most widely used digital devices in the learning of digital literacy skills in the study schools, learners be equipped with the necessary skills to access digital learning platforms and interface through the use of phones to maximize their learning.
3) In partnership with other stakeholders in the education of the visually impaired, digital learning curriculum content should be aligned with national curriculum for the LwVI to see the value of learning digital literacy education.
4) To increase equitable internet access, efforts should be made to improve existing digital infrastructure in study schools in collaboration with other stakeholders in the digital world.
5) School systems should engage teachers, learners, parents and other stakeholders in digital learning content development so that knoeledge and skills to be learnt meet the learning needs of LwVI.

Conflict of Interest Statement

The authors declare no conflicts of interest.

About the Authors

Mr. Kalangwa Robertson Kaluba is a PhD candidate in Special Education at the University of Zambia. He is a Special Education educator in the Zambian Ministry of Education, with several years of experience of teaching learners with visual impairment. He holds a Master of Education in Special Education degree from the University of Zambia and a Bachelor of Education in Special Education degree from the University of Zambia. He also has a certificate in Primary Teaching from Malcolm Moffat College of Education and a Certificate in Information Communication Technology from London Technology College. His research interests are in: education of the visually impaired; Special / Inclusive education classroom practices, as well as in Digital Literacy Education involving Learners with Disabilities.

Dr. Joseph Mandyata is a lecturer, researcher and consultant in the area of special/inclusive education in the Department of Educational Psychology, Sociology and Special Education, School of Education, University of Zambia. He holds a PhD in Special Education, a Master of Education in Special Education and a Bachelor of Arts with Education Degree from the University of Zambia. He has researched, presented papers, and published articles in the areas of special education, inclusive education, educational Administration and management, guidance and counselling, as well as in Early Childhood Education at local and international levels. His research interests are in: special/ inclusive education practice and policy, partnerships in special/inclusive education, curriculum innovation in Special/inclusive education, guidance and counselling, disability, disability, education and poverty, Early-grade Reading Education and educational administration and management.

Dr. Stabile Namwai Ng`ambi is a Lecturer, researcher and Consultant in the Department of Community Education and Lifelong Learning, School of Education, University of Zambia. She holds a PhD in Adult Education, a Master's in Adult Education and a Bachelor of Adult Education Degree from the University of Zambia. She has researched, presented and published articles in the areas of Adult Education, Guidance and Counselling, Lifelong Education, Extension Studies and participatory approaches in Development at local and International levels. Her research interests are in Adult Education, Guidance and Counselling, University Extension Education, disability Community Education and participation, and Lifelong Learning.

Dr. Kalisto Kalimaposo is a Senior Lecturer, researcher and consultant at the University of Zambia, School of Education, Department of Educational Psychology, Sociology and Special Education. He holds a PhD in Sociology of Education, a Master's degree in Sociology of Education and a Bachelor's degree in Sociology and Library & Information Studies from the University of Zambia. He has published and presented papers on a wide range of educational issues in local and international journals. His research interests include equity studies in education, curriculum innovation, teacher education, sociology of disability, transformative learning, comparative and development education, primary education and entrepreneurial education.

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