

<https://doi.org/10.34142/2709-7986.2025.30.2.06>

EXPLORING TEACHING STRATEGIES TO ENHANCE ICT SKILLS IN VISUALLY IMPAIRED LEARNERS: IMPLICATIONS FOR INCLUSIVE EDUCATION

ДОСЛІДЖЕННЯ НАВЧАЛЬНИХ СТРАТЕГІЙ ДЛЯ РОЗВИТКУ НАВИЧОК ВИКОРИСТАННЯ ІКТ В УЧНІВ ІЗ ВАДАМИ ЗОРУ: НАСЛІДКИ ДЛЯ ІНКЛЮЗИВНОЇ ОСВІТИ

Received: 10/04/2025

Accepted: 22/05/2025

Pule SERERO¹, & Gawie SCHLEBUSCH²



¹Ph.D., Lecturer in Department of Post Graduate Studies Education, Central University of Technology, Free State, South Africa.

✉ E-Mail: pserero@cut.ac.za

ORCID <https://orcid.org/0009-0002-8313-0830>



²Professor in Department of Post Graduate Studies Education, Central University of Technology, Free State, South Africa.

✉ E-Mail: gschlebu@cut.ac.za

ORCID <https://orcid.org/0000-0001-9446-2078>

How to Cite (APA Style):

Serero, P., & Schlebusch, G. (2025). Exploring teaching strategies to enhance ICT skills in visually impaired learners: Implications for inclusive education. *Educational Challenges*, 30(2), 71–85. <https://doi.org/10.34142/2709-7986.2025.30.2.06>

ABSTRACT

Purpose. The growing demand for inclusive education has led to the widespread use of information communication technologies as essential tools for supporting visually impaired learners in full-service schools. This

Meta. Зростаючий попит на інклюзивну освіту спричинив широке використання інформаційно-комунікаційних технологій як ключових інструментів для підтримки учнів із вадами зору у школах із повним

© Pule SERERO, & Gawie SCHLEBUSCH, 2025

Exploring teaching strategies to enhance ICT skills in visually impaired learners: Implications for inclusive education © 2025 by Pule SERERO, & Gawie SCHLEBUSCH is licensed under Attribution-NonCommercial 4.0 International. To view a copy of the license, visit <http://creativecommons.org/licenses/by-nc/4.0/>

paper explores teachers' strategies to improve information communication technology skills development of visually impaired learners.

Methodology. Using a qualitative case study design within an interpretive framework, the study collected data through focus group interviews, observations, and document analysis. Purposive sampling was used to identify suitable teachers, resulting in four focus groups, each with five teachers (20 in total). The data were analysed thematically to uncover key trends and insights.

Results. The findings of this study highlight the importance of information communication technology skills in supporting the development of such skills for visually impaired learners within a full-service school. While teachers demonstrate a positive attitude towards utilising information communication technologies, challenges remain in effectively enhancing the skills of visually impaired learners due to limited resources, insufficient training, and inconsistent implementation of such information communication technology strategies.

Conclusions. The study recommends acquiring a diverse range of relevant and accessible information and communication technology resources, along with professional development opportunities for teachers. This strategy would enable full-service schools to foster a more inclusive and effective learning environment for visually impaired learners, equipping them with the necessary tools and support to fully engage with educational content and develop essential information and communication technology skills.

Keywords: Bronfenbrenner's bio-ecological systems model, full-service school, information communication technology skills, visually impaired learners.

спектром послуг. У цій статті досліджуються стратегії щодо вдосконалення розвитку навичок використання інформаційно-комунікаційних технологій у таких учнів.

Методологія. Використовуючи якісне кейс-дослідження в межах інтерпретативної парадигми, розвідка збрала дані за допомогою фокус-групових інтерв'ю, спостережень і аналізу документів. Цілеспрямований відбір дозволив ідентифікувати відповідних учителів, у результаті чого було сформовано чотири фокус-групи по п'ять учасників у кожній (загалом 20). Дані були проаналізовані тематично для виявлення ключових тенденцій і висновків.

Результати. Отримані дані підкреслюють важливість навичок використання інформаційно-комунікаційних технологій у підтримці навчання учнів із вадами зору в школах із повним спектром послуг. Незважаючи на позитивне ставлення вчителів до використання інформаційно-комунікаційних технологій, залишаються труднощі у підвищенні рівня навичок учнів через обмежені ресурси, недостатню підготовку та непослідовне впровадження відповідних стратегій.

Висновки. Дослідження рекомендує забезпечити широкий спектр доступних та актуальних інформаційно-комунікаційних технологій, а також надати можливості для професійного розвитку вчителів. Такий підхід дозволить школам із повним спектром послуг створити більш інклюзивне та ефективне навчальне середовище, забезпечуючи учнів із вадами зору необхідними інструментами та підтримкою для повноцінного засвоєння навчального матеріалу та розвитку ключових навичок у сфері інформаційно-комунікаційних технологій.

Ключові слова: біоекологічна модель Бронфенбреннера, школа із повним спектром послуг, навички використання інформаційно-комунікаційних технологій, учні із вадами зору.

INTRODUCTION

As technology reshapes daily life, it is essential for all learners, including visually impaired learners (VILs), to access and benefit from digital tools, especially in full-service schools (FSSs). Information Communication Technology (ICT) skills are crucial for VILs to engage with digital content and overcome limitations imposed by visual impairments (Wu, 2024). Research indicates the positive impact of ICT skills on educational outcomes (Ghoneim et al., 2024), and teachers play a key role in enhancing these skills by adapting materials for accessibility (Sri Takshara & Bhuvanewari, 2025).

However, many teachers face challenges, including lack of training, limited ICT access, and emotional strain (Kana & Hagos, 2024). The rapid pace of technological change also hinders their ability to keep up. Additionally, ICT availability in FSSs is often inadequate, and specialised resources are insufficient to meet VILs' diverse needs. Without access to appropriate ICTs and training, VILs are at a disadvantage academically and socially.

This highlights the need for more targeted professional development (Tshabalala et al., 2025), better resources, and ongoing support for teachers. This study aims to explore strategies to overcome barriers and enhance ICT integration for VILs.

The study was guided by the following research objectives:

- To investigate the teaching strategies and methods employed by teachers to enhance ICT skills in VILs.
- To examine the challenges faced by teachers in integrating ICTs into their teaching practices for VILs.
- To analyse the impact of teachers' strategies on the academic development of VILs in a FSS.

REVIEW OF RELATED LITERATURE

– Information communication technology skills and visually impaired learners

As the use of ICTs becomes increasingly vital in creating inclusive educational environments, the ability of teachers to effectively use these ICTs is crucial for supporting VILs. Teachers are the key agents responsible for introducing ICTs to VILs (Sahin, 2025). Without their involvement, VILs would struggle to effectively use these ICTs to access digital information, as the responsibility for ICT integration rests primarily with teachers (Ghoneim et al., 2024).

For this reason, it is essential that teachers not only have a solid understanding of ICTs but also master the skills necessary to teach them to VILs. This requires teachers to possess TPK (teachers' pedagogical knowledge) to effectively support ICT skills development in VILs (Zhang & Li, 2025). Without adequate TPK competence, teachers will struggle to deliver effective ICT teaching, ultimately hindering VILs' ability to benefit from these ICTs (Zhang & Li, 2025).

Several studies have explored the ICT skills of teachers who teach VILs, focusing on basic ICT skills, their technological needs (Kana & Hagos, 2024), the challenges they face regarding ICT access, the importance of these ICTs (Buthelezi et al., 2024), and the TPK of teachers of VILs (Ghoneim et al., 2024). These studies reveal that teachers of VILs possess basic ICT skills such as navigating a computer, using word processing programs, and communicating online. However, they also face challenges when using ICTs that rely on visual elements, which are essential but difficult to implement for VILs.

While several studies examine the ICT skills of teachers of VILs (Kana & Hagos, 2024), few have specifically investigated the teaching strategies used by these teachers within inclusive school contexts. In addition, some studies highlight that teachers use social media to teach VILs (Ghoneim et al., 2024). However, the increased workload associated with using ICTs for teaching VILs is often noted as a significant challenge (Sharma et al., 2025). Despite these challenges, ICTs offer significant potential for fostering the inclusion of VILs (Sri Takshara & Bhuvaneshwari, 2025).

Although existing studies explore various aspects of ICT skills for teaching VILs, they do not delve into the specific teaching strategies used to develop these skills. Some

research has focused on teachers' use of screen readers (Kirboyun Tipi, 2023), while others have examined teachers' preparedness to implement ICT literacy programs (Guan et al., 2025). However, these studies indicate that many teachers lack adequate preparation and resources to effectively develop ICT skills in VILs. For example, Kana and Hagos (2024) found that VILs often lack access to ICTs and feel demotivated due to the exclusion of Braille from the curriculum. Consequently, there is a clear gap in understanding the strategies teachers use to develop ICT skills in VILs in inclusive schools.

– **Strategies to develop information communication technology skills in visually impaired learners**

Teachers play a crucial role in equipping VILs with the ICT skills needed to succeed in an increasingly digital world (Sahin, 2025). In the framework of inclusive education, it is vital to provide VILs with the necessary ICTs to actively participate in their learning journey (Luvale, 2025). This strategy not only fosters their academic growth but also ensures that the principles of inclusion are upheld, allowing all learners, regardless of their abilities, to engage fully in the digital educational landscape. To facilitate this, teachers use a variety of strategies.

One key strategy involves the use of specialised ICTs such as screen readers, Braille displays, and voice recognition software. These ICTs help VILs access digital content and interact with learning materials effectively. The use of such ICTs allows VILs to engage with educational resources on an equal footing with their sighted peers, promoting inclusivity in the classroom (Tuttle & Carter, 2023).

In addition to using ICTs, adapting digital materials is another essential teaching strategy (Castaneda et al., 2025). Teachers convert content into formats accessible to VILs, such as audio files or Braille, ensuring that all learners can engage with the learning material. This strategy ensures that VILs do not face barriers when interacting with educational content. Furthermore, tactile aids and audio feedback systems provide additional means for VILs to interact with devices and computers without relying on visual cues. These systems help foster independence and build confidence, which are critical components of inclusive education (Malisiova & Folia, 2024).

Personalised teaching is another effective strategy used by teachers to enhance the ICTs skills of individual VILs (Erasto et al., 2024). Tailoring lessons and learning experiences to each learner's abilities allows them to work at their own pace and use the ICTs that best suit their needs. This individualised strategy not only helps VILs develop ICT skills but also ensures that they are included in the educational process (Almufareh et al, 2024).

Additionally, collaborative learning opportunities, where VILs work together using shared technology, have been shown to promote both ICT skills and social integration, further enhancing inclusivity (Navas-Bonilla et al., 2025). However, despite these promising strategies, many teachers still face challenges. Insufficient training, limited access to specialised equipment, and a lack of awareness about the unique needs of VILs hinder the implementation of these strategies (Buthelezi et al., 2024).

As a result, VILs may not have access to essential ICTs such as screen readers and Braille embossers, which are crucial for their full participation in the digital learning environment. The effectiveness of these ICTs is closely linked to how well teachers are trained to use them. Without proper training and access to necessary resources, the principles of inclusive education may not be fully realised for VILs (Diasse & Kawai, 2024).

THEORETICAL FRAMEWORK

This study applies Bronfenbrenner's bio-ecological systems model to examine how teachers develop ICT skills in visually impaired learners. The model explores interactions across microsystems, mesosystems, exosystems, macrosystems, and chronosystems, all of which influence teachers' methods in full-service schools (Bronfenbrenner, 1979). It was selected for its ability to provide insight into the various factors shaping teachers' strategies.

According to Bronfenbrenner (1979), the ecosystem consists of nested systems that affect individual development. The microsystem, the innermost layer, includes factors such as ICT resources, the learners themselves, the school environment, and the beliefs of teachers and their families. A supportive microsystem fosters positive attitudes and effective ICT teaching strategies, whereas a less supportive one may hinder skill development. The mesosystem refers to the relationships between multiple microsystems, such as interactions between families, schools, and local communities. When these are aligned, teachers face fewer challenges in developing ICT skills in learners. In contrast, conflicting influences can impede effective teaching.

The exosystem includes external influences, such as media and community structures, which indirectly affect teachers' strategies. For example, negative media portrayals of ICT teaching for VILs may undermine teachers' confidence and strategies. The macrosystem encompasses broader cultural and societal influences, including beliefs and values that shape ICT integration in education. The chronosystem highlights how these influences evolve over time. In this study, the perceptions of teachers in full-service schools of ICT use are shaped by their interactions within this dynamic, multi-layered ecosystem.

METHODOLOGY

This study employed a qualitative case study design within the interpretivist paradigm. This approach was selected to explore teachers' strategies for developing ICT skills in VILs. To gather rich, comprehensive data, the research utilised a combination of focus group interviews, document analysis, and classroom observations.

These methods provided diverse perspectives and insights into the participants' experiences and viewpoints (De Paoli, 2023). Focus group interviews were conducted to encourage interactive discussions among participants. This format allowed for clarification of unclear questions, ensuring responses were relevant and reducing the likelihood of providing ambiguous or irrelevant answers (DeJonckheere & Vaughn, 2019).

To address the research questions, the study also involved analysing key documents, including the Education White Paper 6, the White Paper on e-Education, School-Based Support Team files, lesson plans, personal records of the participants, and VILs' profiles. Document analysis assisted with assessing the scope and depth of teaching within the school setting, offering valuable insights into institutional policies and frameworks that influence teaching practices (Morgan, 2022). This method complemented the data from interviews and observations, providing a deeper understanding of teachers' strategies to enhance ICT skills for VILs.

The combination of these data collection methods facilitated triangulation, which allowed for a more robust comparison of teachers' views from various sources. This process was essential in confirming the reliability of the findings, ensuring a more accurate and credible understanding of the phenomena being studied (Ahmed, 2024). By integrating focus group discussions, document analysis, and observations, this research aimed to

provide a comprehensive understanding of the challenges involved in enhancing ICT skills for VILs, while also ensuring the reliability and validity of the study's outcomes.

– Sampling

Purposeful sampling was used to select information-rich participants who could provide relevant and insightful data (Shaheen et al., 2019). Twenty teachers who used ICTs to teach VILs were purposefully sampled for the study. These participants had between 5 and 35 years of teaching experience in primary schools that accommodated VILs. All twenty participants held the appropriate teacher qualifications for primary school education.

The participants were assigned codes for the four focus group interviews (each consisting of five teachers), i.e., FG1T1 (Focus Group 1 Teacher 1), FG2T3 (Focus Group 2 Teacher 3), etc. Prior to the study, we contacted the teachers, explaining the purpose of the study and inviting them to participate in interviews and document analysis. Of the 20 participants, four Grade 6 teachers (FG1T5, FG2T1, FG3T1, and FG4T1) volunteered to participate in the observation and document data collection stages. All participants were provided with an ethical clearance letter and were asked to read, understand, and sign consent forms.

– Data collection

In line with the qualitative research methodology, we employed semi-structured focus group interviews, classroom observations, and document analysis as data collection instruments. Participants engaged with the focus group interview questions, which were based on a prepared interview schedule that explored how teachers taught ICT skills to VILs. During the observation and document data collection phases, four participants volunteered to take part.

This approach was specifically designed to explore the enhancement of ICT skills for VILs within the Fezile Dabi education district in South Africa. All interviews were recorded using a mobile phone, with each session lasting approximately 45 minutes. The data collected through interviews, observation and document analysis were subsequently transcribed and analysed by the researchers.

– Data analysis

Data analysis followed a thematic approach as outlined by Liu (2023). To gather data, we utilised focus group interviews with teacher participants, document analysis, and classroom observations. We employed open coding, which involved examining the data by repeatedly reading the transcribed responses and the notes taken during document analysis and classroom observations. We then coded the similarities and differences that emerged.

During this process, we used stickers to highlight key meanings derived from the participants' responses. This also involved identifying connections among the open codes, exploring the factors that influenced these links, the situations that triggered them, and the contexts in which teachers used ICT to enhance VILs' skills.

To derive the essential themes, we reviewed the sections of data and grouped them based on patterns identified both in the literature and from the teachers' statements. The themes that emerged reflected the major findings and were organised in the order they appeared. These themes were semantic, meaning they were based on the explicit data gathered from the participants, rather than latent themes with underlying assumptions or ideas.

– Ethical considerations

Ethical clearance was obtained from the university's Research Ethics Review Committee, and the Free State Department of Education granted permission to conduct the study in its schools. Participants received an invitation letter outlining the study's purpose and voluntary nature.

All twenty participants provided informed consent, ensuring confidentiality, anonymity, and privacy. Member checking enhanced data credibility, allowing participants to verify interpretations. Ethical responsibilities included protecting participants from harm and ensuring honesty. Data will be securely stored for five years (Hendon et al., 2024).

RESULTS

The main purpose of the research was to explore teachers' strategies to enhance ICT skills in VILs. The data revealed six main themes: availability of ICTs when teaching ICT skills to VILs; comfort level with ICTs when introducing them to VILs; adherence to School-Based Support Team (SBST) and District-Based Support Team (DBST) guidelines on teaching ICTs to VILs; usability of ICTs when teaching ICTs to VILs; and relevance of ICTs when teaching ICT skills to VILs.

Theme 1: Availability of ICTs when teaching ICT skills to VILs

The data collected indicated that the availability of ICTs was an important factor for teachers when teaching such ICT skills to VILs. Participants FG2T3 and FG1T1 highlighted that they relied on the ICTs available at their school. For example, FG2T3 shared:

"I use ICTs that I can match with the curriculum. And then I also use what is available in the school. I realised that some visually impaired learners do not like using Braille because they don't know it. Ehh, I must say that they can't really read and write it. So, this is a big problem for me."

FG1T1 commented:

"Well, eehhh to be honest Sir, even though I try to use strategies like the SIAS process, I find it being problematic because we battle to have these tools in our school. I simply choose an ICTs and recommend to a learner what is available in our school."

The above information reveals that teachers relied on the available ICTs as their strategy to teach ICT skills to VILs. This finding aligns with the research by Odekeye et al. (2024), which highlights that teaching ICT skills to VILs depends on the availability and use of ICTs in schools. Observations during the study confirmed this with teachers using available ICTs like overhead projectors during lesson presentations.

According to McGregor and Goodale (2025), overhead projectors can be used when performing demonstrations to VILs. In agreement, ICT policies found in the SBST file revealed that successful teaching of ICT skills to VILs is dependent on the availability of ICT resources.

However, this dependency on available ICTs was not reflected in the lesson plans, highlighting a gap between policy intentions and practical application in the classroom, echoing Parveen et al. (2024), who found that institutional support and resource access play a key role in effective teaching of ICT skills to all learners.

Theme 2: The comfort level with ICTs when introducing them to VILs

Data collected in this study revealed that teachers' comfort level with ICTs played a role in their strategy to teach ICT skills to VILs. Participants emphasised the importance of

not only having access to appropriate ICTs but also feeling confident and comfortable with using them. Comfort with ICTs allowed teachers to effectively introduce these ICTs into their teaching, fostering a more inclusive learning environment.

In line with this, participants FG1T1, FG1T5, and FG2T1 indicated the importance of comfort in their use of ICTs when teaching ICT skills to VILs. For instance, FG1T1 shared:

“My strategy is to look at, eeeh, what the child or learner likes to use when say reading a workbook or whatever we are doing in class at time, then I know that he likes to use say hand magnifier. So, I will then believe that he is comfortable or relaxed in using that hand lens of magnifier. Due to knowing that he is comfortable with that tool then he will use it forever since we don't have other tools. From my side, I also want to feel relaxed when I use such a tool in my class when teaching such learner”

FG1T5 added:

“Sometimes when these devices are available in the storeroom, I will take them bring to my class, but others are heavy like the overhead projector. So, I don't like carrying it up and down...Okay when I get to my class I will, eeeeeh, then ask them which one they like to use to read or something like that if I bring magnifiers or papers that are printed in large of big writing ...sorry fonts. If they choose lenses or hand lenses, then then I know that they are comfortable with them. Nna (myself), even when I don't feel comfortable with say a computer, I must use it because I don't have a choice. I must teach these learners who are in my classroom.”

FG2T1 remarked:

“I think other ICTs like white board don't make them feel comfortable because it is always far from them. Also, Braille papers and machines are heavy, and other learners complain about making noise when they use those machines, so they don't like the Braille machine. Now what I do is that I allow them to use any device which make them comfortable even these comfortable ones like hand magnifiers are sometimes few or unavailable at our school”

Observations and document analysis revealed that although teachers were comfortable using ICTs, they faced challenges in adapting their lesson plans to effectively meet the needs of all VILs. Teachers used ICTs like an overhead projector, handheld magnifiers, Braille papers and interactive white boards, but their ability to use these ICTs in lessons was limited. Research by Stumbrienė et al. (2023) highlights that knowledge of ICTs supports innovative teaching, but effective adaptation of lessons is essential for VILs. Teaching ICT skills to VILs requires both teacher proficiency with ICTs and the ability to adjust lessons to meet their unique needs.

Theme 3: Adherence to SBST and DBST guidelines on teaching ICTs to VILs

Data collected in the study revealed that teachers' strategies to teaching ICT skills to VILs were influenced by the guidance and approval of the School-Based Support Team (SBST) and the District-Based Support Team (DBST). These teams provided recommendations for ICTs and teaching strategies. However, despite these recommendations, a significant challenge arose; the recommended ICTs were not available at the school. As a result, teachers' lesson plans often did not include the ICTs suggested by the SBST and DBST.

For example, participants FG1T2, FG2T4 and FG4T4 emphasised their reliance on the SBST for guidance but noted the issue of unavailability of the recommended ICTs. FG1T2 said:

"I don't have specific strategies myself, but I try to follow what the SBST says or tell me to do. Our SBST will tell me that the DBST recommended to us to use Braille equipment or overhead projectors or white boards to teach learners who are visually impaired. But for me personally I see these strategies are not working. So, what I do is maybe look first at what the learner likes when he reads. So, I use to because it available in our school."

FG2T4 stated:

"Me too Sir, I try to follow what we are told to do by SBST members. They tell me or use to use different ICTs sometimes I didn't see them in my life, or I don't know them. But usually, they say to use that we must use ICT this or that and what they suggest or recommend is not available at our school, and this affects my lesson planning."

FG4T4 added:

"When I get a problem with a blind, no a visually impaired child, I usually ask for help from our SBST chairperson because she is the one who attends inclusive education meetings and workshops. I don't know if I am right. She, as the SBST member helps me with strategies from the DBST if I remember well, but it is difficult to implement their recommendations or advices when our school doesn't have what they say we can use to teach these learners. Those ICTs like iPads or what do they call it are not available in our school."

These responses illustrate a gap between the recommendations provided by the SBST and DBST and the actual resources available at the school. Due to the unavailability of the recommended ICTs, teachers had to plan their lessons, often relying on whatever ICTs are available, which limited their ability to fully implement the recommended strategies.

The document analysis and classroom observations further confirmed that the teachers' lesson plans did not incorporate the recommended ICTs, as these were unavailable at the school. Instead, lesson plans frequently omitted the specific ICTs suggested by the SBST and DBST, requiring teachers to adapt their lessons to the ICTs that were accessible, even if these were not the most suitable for teaching ICT skills to VILs.

Research highlights the importance of access to the recommended ICTs for effectively teaching ICT skills to learners with disabilities, including VILs. Chuene and Teane (2024) assert that, while the SBST and DBST provide guidance to teachers, the lack of resources hinders the effective use of ICTs. For ICT integration to be successful for learners with disabilities, including VILs, teachers must not only receive support from teams such as the SBST and DBST but also have access to the appropriate ICTs required for effective teaching.

Theme 4: The usability of ICTs when teaching ICTs to VILs

The data collected in this study revealed that teachers' strategies for teaching ICT skills to VILs focused on the usability of ICTs. Teachers recognised that the effective strategies for teaching ICTs to VILs were those that aligned with the needs and preferences of the learners, ensuring that the ICTs were accessible and practical for their use. For example, FG1T4 emphasised the importance of learner preference, stating:

"For me, my strategies revolve, or my plans are around using what a visually impaired learner want to use during that period or what she like to use when reading a workbook or writing a classwork or a task. Yes, she will want to use say a laptop when it is available but only to find that she is unable to use it because she cannot type, or she don't know how to enlarge letters."

FG2T1 was more specific, stating:

"I use computers that are connected to the Internet. Hmmmm I only use them when our school has internet access. Yes, sometimes I use iPads or laptops when available because our principal lock them in his office. So, depending on my lesson for the day I also use the audio materials like a tape recorder and cell phones where I send my voice notes to the cell phones of these learners, but ehh and only when they have a cell phone. Our school has the white board, and I also try to use it. But eish, I struggle with that board."

FG3T2 said:

"I use computers that is connected to the internet and books with big fonts. But these computers are sometimes not working because they are flat. We struggle with electricity and internet. I also use papers or books with big fonts."

Teachers prioritised the accessibility and usability of ICTs when teaching ICT skills to VILs, focusing on ICTs that allowed for independent learner engagement. However, analysis of lesson plans and classroom observations revealed that ICTs were often not systematically incorporated into lessons, with teachers relying on available resources. This led to inconsistent use of ICTs, which were sometimes not ideal for individual VILs, limiting the effectiveness of ICT skills teaching. Lestari et al. (2025) highlight the importance of ICT usability for learners with disabilities, emphasising that ICTs must be accessible and user-friendly for independent engagement.

This includes tailoring ICTs to meet the specific needs of VILs, such as compatibility with Braille displays or screen readers, to ensure effective learning. Furthermore, Haider et al. (2025) highlight that teacher proficiency and comfort with ICTs are crucial for successful integration, as teachers who are proficient with ICTs are better able to adapt their teaching methods and make ICT skills more engaging and inclusive for VILs.

Theme 5: The relevance of ICTs when teaching ICT skills to VILs

Teachers emphasised the importance of selecting ICTs that were directly relevant to the needs of VILs when teaching ICT skills. This strategy aligns with McDuff et al. (2019), who assert that the relevance of ICT tools is key to ensuring accessibility and effective learning for VILs. Likewise, Lestari et al. (2025) highlight that choosing the right ICTs not only enhances learners' ability to engage with content but also promotes their independence in the learning process. Teachers' focus on the appropriateness of these tools reflects a broader understanding that such ICTs are essential for improving VILs' educational outcomes. Supporting this, participants FG1T1, FG3T2, and FG4T5 confirmed that they adopted the relevance of ICTs as a teaching strategy. FG1T1 stated:

"Eeeeh regarding relevance or ehh appropriateness in this case let me say, I usually use the overhead projector to teach learners who are visually impaired because I can enlarge the writings on it. Let me say the overhead projectors helps me to enlarge whatever that I put on the screen and that helps me a lot ..eeeh I can use it to show them some big pictures or writings. Yes, it helps me to show these learners the learning contents in big fonts. Sometimes I use a tape recorder that has good speakers."

FG3T2 commented:

"With me, relevance of the ICTs is a big thing, I make sure that when the ICT is available to be used to present my lesson then it is relevant. Let me give you an example, when I want teach subtraction to my learners, they must see what I do so

I can use the large or write with big letters on the chalkboard or white board, so I can use the chalkboard or white board."

FG4T5 stated:

"I like using audio books because it's simple to use. They become relevant because they can listen instead of looking. This is my thinking, and I am not generalising. Sometimes I use books or papers in Braille and a phone with enlarged buttons because I believe they are relevant in my teaching. Yes, I have children in my class who own cell phones, so I try to use them to teach them."

DISCUSSION

The emphasis on selecting suitable tools aligns with research by McDuff et al. (2019), who argue that ICT tool selection should be guided by the learner's abilities, ensuring that the ICTs are accessible and meaningful for their educational progress. The relevance and accessibility of ICTs, as noted by the participants, are crucial for improving VILs' interaction with content, fostering independent learning, and enhancing their educational outcomes (Lestari et al., 2025).

The ICT policies also reflect a similar focus on considering learners' needs when selecting ICT tools. However, the ICTs were not explicitly outlined in the lesson plans, suggesting that teachers may not have prioritised ensuring accessibility for VILs. Additionally, the lesson plans lacked specifics on how ICTs would be adapted to accommodate the varied abilities of VILs. This absence of detailed strategies for differentiating teaching indicates that while teachers intended to cater to VILs' needs, there was a lack of systematic planning to ensure that ICTs were consistently tailored to individual abilities.

Classroom observations (Kazachiner, 2020), (Dovzhenko, 2022), however, did not fully support these findings. Teachers were not observed adjusting ICTs to fit the specific needs of learners, such as using an overhead projector for VILs with varying levels of visual impairment. For example, during one observation, a teacher did not adapt the lesson plan to use an accessible IWB for a learner with partial vision. It was noted that teachers often relied on whatever ICTs were available at the time, rather than proactively selecting the most suitable tools for each learner.

While this strategy was practical, it led to inconsistencies in how effectively ICTs were utilised to enhance the ICT skills of VILs. The findings align with Makofane et al. (2024), who suggest that the successful use of ICTs for VILs requires careful consideration of individual needs and the alignment of resources. As McDuff et al. (2019) note, selecting appropriate tools is essential to ensure that VILs can engage with content and participate in the learning process independently.

CONCLUSIONS

The findings of this study highlight the importance of ICTs in supporting the development of ICT skills in VILs within full-service schools (FSSs). While teachers demonstrate a positive attitude towards utilising ICTs, challenges remain in effectively enhancing VILs' skills due to limited resources, insufficient training, and inconsistent implementation of ICT strategies. To address these challenges, the study advocates for the acquisition of a diverse range of relevant and accessible ICT resources, alongside professional development opportunities for teachers. This would enable FSSs to create a more inclusive and effective learning environment for VILs, ensuring that they have the

tools and support needed to fully engage with educational content and develop essential ICT skills.

Based on the study's findings, the following recommendations are proposed: South African teachers should receive in-service training on effectively teaching ICT skills to visually impaired learners. The SBST should seek retraining on newly developed ICT tools, both hardware and software, directly from suppliers to ensure teachers are well equipped to integrate them into their teaching. Additionally, the Department of Basic Education should organise practical workshops for full-service schoolteachers, scheduling them during weekends or school holidays to minimise conflicts that may hinder attendance.

ACKNOWLEDGEMENTS

We would wish to thank all those who contributed to the study, especially the research participants.

CONFLICT OF INTERESTS

The authors declare that there are no conflicts of interest regarding the publication of this paper.

FUNDING

The authors declare that this study received no specific financial support.

REFERENCES

- Ahmed, S. K. (2024). The pillars of trustworthiness in qualitative research. *Journal of Medicine, Surgery, and Public Health*, 2, 100051. <https://doi.org/10.1016/j.gjmedi.2024.100051>
- Almufareh, M. F., Kausar, S., Humayun, M., & Tehsin, S. (2024). A Conceptual Model for Inclusive Technology: Advancing Disability Inclusion through Artificial Intelligence. *Journal of Disability Research*, 3(1), 1– 11. <https://doi.org/10.57197/jdr-2023-0060>
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.
- Buthelezi, S. P., Zondo, N. M., Nxumalo, L. T. M., & Vilakazi, M. (2024). Determining the digital divide among people with disabilities in KwaZulu-Natal. *South African Journal of Information Management*, 26(1), 1– 12. <https://doi.org/10.4102/sajim.v26i1.1820>
- Castaneda, J. A. C., Lin, P.-C., Hung, P. C. K., Zhong, H.-X., Tseng, H.-A., Huang, Y.-F., & Ahmad, R. (2025). Designing inclusive tech playful educative solutions for visually impaired learners in STEM education. *Smart Learning Environments*, 12(1), Article 4. <https://doi.org/10.1186/s40561-024-00358-x>
- Chuene, D. M., & Teane, F. M. (2024). Resource inadequacy as a barrier to effective curriculum implementation by life sciences teachers in South Africa. *South African Journal of Education*, 44(2), 1–10. <https://doi.org/10.15700/saje.v44n2a2387>
- De Paoli, S. (2023). Performing an inductive thematic analysis of semi-structured interviews with a large language model: An exploration and provocation on the

- limits of the approach. *Social Science Computer Review*, 42(4), 997–1019. <https://doi.org/10.1177/08944393231220483>
- DeJonckheere, M., & Vaughn, L. M. (2019). Semi-structured interviewing in primary care research: A balance of relationship and rigour. *Family Medicine and Community Health*, 7(2), e000057. <https://doi.org/10.1136/fmch-2018-000057>
- Diasse, M. D., & Kawai, N. (2024). Barriers to curriculum accessibility for students with visual impairment in general education settings: The experience of lower secondary school students in Senegal. *The Curriculum Journal*, 36(1), 110–125. <https://doi.org/10.1002/curj.269>
- Dovzhenko, T. (2022). Inclusive Education Implementation: the Experience of the Faculty of Primary Education. *Educational Challenges*, 27(1), 67–79. <https://doi.org/10.34142/2709-7986.2022.27.1.06>
- Erasto, E., Mwakalapuka, A., & Msangya, B. (2024). Effective use of individualized education programme instructional approaches and methods to students with visual impairment in inclusive education. *International Journal of Education and Social Science Research*, 7(5), 142–165. <https://doi.org/10.37500/ijessr.2024.7512>
- Ghoneim, R., Aljedaani, W., Bryce, R., Javed, Y., & Khan, Z. I. (2024). Why are other teachers more inclusive in online learning than us? Exploring challenges faced by teachers of blind and visually impaired students: A literature review. *Computers*, 13(10), Article 247. <https://doi.org/10.3390/computers13100247>
- Guan, L., Zhang, Y., & Gu, M. M. (2025). Pre-service teachers' preparedness for AI-integrated education: An investigation from perceptions, capabilities, and teachers' identity changes. *Computers and Education: Artificial Intelligence*, 8, 100341. <https://doi.org/10.1016/j.caeai.2024.100341>
- Haider, M. M., Atta, M. A., Gul, A., Shah, S. S. A., & Shah, S. W. A. (2025). Teacher Qualifications and Proficiency in the use of Information and Communication Technology: A Performance Comparison. *The Knowledge*, 4(1), 1–14. <https://doi.org/10.63062/tk/2k25a.41029>
- Hendon, M., Taylor, W., & Waldrep, J. (2025). Ethical Considerations in Graduate Information Technology Qualitative Research: Human Research Protections and Considerations. In R. Throne (Ed.), *IRB, Human Research Protections, and Data Ethics for Researchers* (pp. 75–102). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-3848-3.ch004>
- Kana, F. Y., & Hagos, A. T. (2024). Factors hindering the use of Braille for instruction and assessment of students with visual impairments: A systematic review. *British Journal of Visual Impairment*, 43(2), 396–406. <https://doi.org/10.1177/02646196241239173>
- Kazachiner, O. (2020). Developing Philology Teachers' Inclusive Competence in Postgraduate Education. *Educational Challenges*, 25(1), 31–45. <https://doi.org/10.34142/2709-7986.2020.25.1.03>
- Kirboyun Tipi, S. (2023). How screen readers impact the academic works of college and graduate students with visual impairments. *Sakarya University Journal of Education*, 13(3), 416–434. <https://doi.org/10.19126/suje.1201482>
- Lestari, G. D., Adhe, K. R., Yulianingsih, W., Rosyanafi, R. J., & Widiaswari, M. (2025). The influence of teachers' ICT competence on children's digital literacy abilities.

- Edelweiss Applied Science and Technology*, 9(1), 335–340. <https://doi.org/10.55214/25768484.v8i6.4132>
- Liu, W. (2023). The cognitive basis of thematic analysis. *International Journal of Research & Method in Education*, 47(3), 277–287. <https://doi.org/10.1080/1743727x.2023.2274337>
- Luvale, B. N. (2025). Digital literacy skills for students with visual and hearing impairments in Kenyan public universities. *Library Hi Tech News*, 42(3), 18–23. <https://doi.org/10.1108/lhtn-10-2024-0190>
- Makofane, I. B., Ndlovu, S. M., Mphahlele, H., & Themane, M. J. (2024). The use of screening, identification, assessment and support policy to support vulnerable learners. *International Journal of Educational Management & Development Studies*, 5(4), 136–157. <https://doi.org/10.53378/ijemds.353121>
- Malisiova, A. & Folia, V. (2025). Transforming Multicultural Classrooms Into Inclusive Environments: Implementing Intercultural and Inclusive Education Practices and Approaches. In J. Etim & A. Etim (Eds.), *Diversity and Inclusion in Global Business and Education* (pp. 291–320). IGI Global Scientific Publishing. <https://doi.org/10.4018/978-1-6684-9897-2.ch013>
- McDuff, N., Hughes, A., & Sharma, S. (2019). The inclusive curriculum. In S. Marshall (Ed.), *A handbook for teaching and learning in higher education* (pp. 106–122). Routledge. <https://doi.org/10.4324/9780429259500-9>
- McGregor, S. L., & Goodale, K. (2025). Don't throw away your old overhead projectors: Upcycle to easy physics demos instead. *The Physics Teacher*, 63(2), 107–109. <https://doi.org/10.1119/5.0167389>
- Morgan, H. (2022). Conducting a qualitative document analysis. *The Qualitative Report*, 27(1), 64–77. <https://doi.org/10.46743/2160-3715/2022.5044>
- Navas-Bonilla, C. del R., Guerra-Arango, J. A., Oviedo-Guado, D. A., & Murillo-Noriega, D. E. (2025). Inclusive education through technology: A systematic review of types, tools and characteristics. *Frontiers in Education*, 10, Article 1527851. <https://doi.org/10.3389/feduc.2025.1527851>
- Odekeye, O. T., Adewusi, M. A., Sobemekun, O. M., & Olawoyin, K. G. (2024). Podcast: A technological tool for improving learning performance in algebra among primary school pupils in Osun state. *Journal Plus Education*, 36(1), 293–307. <http://dx.doi.org/10.24250/jpe/2/2024/OTO/MAA/OMS/KGO/>
- Parveen, A., Jan, S., Bashir, F., Ganie, A. A., & Zimik, P. N. (2025). Promoting Inclusive Learning Environments: A Study of Digital Inclusion in Education. In S. Taukeni & M. Mollaoğlu (Eds.), *Integrating the Biopsychosocial Model in Education* (pp. 407–420). IGI Global Scientific Publishing. <https://doi.org/10.4018/979-8-3693-3707-3.ch017>
- Şahin, F. (2025). Psychological drivers shaping mobile learning utilization among visually impaired university students. *Education and Information Technologies*, 1–25. <https://doi.org/10.1007/s10639-025-13430-x>
- Shaheen, M., Pradhan, S., & Ranajee. (2019). Sampling in qualitative research. In M. Gupta, M. Shaheen, & K. Reddy (Eds.), *Qualitative techniques for workplace data analysis* (pp. 25–51). IGI Global Scientific Publishing. <https://doi.org/10.4018/978-1-5225-5366-3.ch002>

- Sharma, S., Dureja, S., Saini, D., Jose, R., Pant, R., & Singh, A. (2025). Empowering impaired learners: Technological advancements in higher education. *Technology and Disability, 37*(2), 123–136. <https://doi.org/10.1177/10554181251313711>
- Sri Takshara, K., & Bhuvanewari, G. (2025). Empowering visually impaired individuals: The transformative roles of education, technology, and social connections in fostering resilience and well-being. *British Journal of Visual Impairment*. <https://doi.org/10.1177/02646196241310995>
- Stumbrienė, D., Jevsikova, T., & Kontvainė, V. (2023). Key factors influencing teachers' motivation to transfer technology-enabled educational innovation. *Education and Information Technologies, 29*(2), 1697–1731. <https://doi.org/10.1007/s10639-023-11891-6>
- Tshabalala, G., Schlebusch, G., & Makola, S. (2025). Quality assurance practices of internal examinations in selected Eswatini primary schools. *Educational Challenges, 30*(1), 247–261. <https://doi.org/10.34142/2709-7986.2025.30.1.16>
- Tuttle, M., & Carter, E. W. (2023). Assistive technology use among students with visual impairments in academic classes. *Journal of Special Education Technology, 39*(4), 468–480. <https://doi.org/10.1177/01626434231217050>
- Wu, D. (2024). Exploring digital literacy in the era of digital civilization: A framework for college students in China. *Information Services and Use, 44*(2), 69–91. <https://doi.org/10.3233/isu-230199>
- Zhang, Y., & Li, C. (2025). Leveraging pedagogical knowledge for effective technology integration in education: A research-based approach. *International Journal of Educational Research, 130*, 102553. <https://doi.org/10.1016/j.ijer.2025.102553>