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# What ICTs are in use among grade four pupils with special education needs in Zambian Schools, Africa?

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**Abstract**
This study investigated Information and Communication Technologies (ICTs) in use among grade four pupils with Special Educational Needs (SEN) in Sinazongwe District of Zambia, Africa. Adopting a relativist ontological and subjective epistemological stance, and guided by the Technology Acceptance Model, the research employed a qualitative, descriptive case study design. Twenty-seven participants including education officers, administrators, ICT teachers, pupils with SENs, their teachers, and parents were selected through purposive and quota sampling. Data from classroom observations, focus group discussions, and interviews were thematically analyzed. Findings revealed active use of computers, tablets, mobile phones, smart TVs, radios, assistive devices, and communication platforms, but highlighted disparities in device quality, lack of specialized software, infrastructural gaps, limited teacher expertise, and financial barriers. The study recommends the need for targeted policy, capacity building, and equitable resource allocation for inclusive ICT adoption.

**Keywords:** Special Education Needs (SENs), Information Communication Technologies (ICTs), Education, Sinazongwe, Zambia

## Introduction
Understanding the various Information and Communication Technologies (ICTs) in the education of pupils with Special Educational Needs (SENs) is essential for promoting access, equity, inclusion, and the delivery of quality education in both formal and informal contexts. Mapping the ICTs currently in use reveals not only the types of technologies employed during teaching and learning processes but also highlights disparities in infrastructure, capacity, resource allocation, and user attitudes, particularly in low-resource settings. The integration of ICTs for learners with SENs is influenced by a range of socio-technical and pedagogical factors, which ultimately shape learning outcomes, teacher practices, and pupil engagement. In this context, education for pupils with SENs refers to structured, inclusive learning experiences delivered both within formal school environments and at home, encompassing digital, physical, and interpersonal strategies to meet their diverse cognitive, sensory, and physical needs. The study is organized into four sections: an overview of the study's background and context, the theoretical framework guiding the research, the methodology employed, and an analysis of the findings, culminating in a discussion of conclusions and recommendations.

## Background and context
The integration of Information and Communication Technologies in the education of pupils with Special Educational Needs has become a global policy and research imperative, closely aligned with the United Nations Sustainable Development Goal 4, which seeks to ensure inclusive and equitable quality education for all. As UNESCO (2015) asserts, ICTs are "critical enablers of inclusive education," providing pupils with diverse needs the means to access, engage with, and benefit from educational opportunities.
In the context of SENs, ICTs encompass a broad spectrum of tools including hardware, software, digital media, and assistive technologies designed to support communication, differentiated instruction, and learner autonomy (Ratheeswari, 2018; Giannoutsou *et al.*, 2024) [21, 10].

In Zambia, the Ministry of General Education (2021) defines ICTs in SEN education as "the strategic application of digital tools to address diverse learning needs, remove access barriers, and enhance learner participation and autonomy".

A growing body of research has documented the transformative potential of ICTs in education of pupils with SEN. Studies by Simui *et al*. (2017) [22], Khan *et al*. (2015) [14] highlight that ICTs foster multimodal engagement, promote independence, and enable inclusive classroom practices.

Internationally, ICTs are recognised for enhancing teaching, supporting collaborative and individualised learning, and increasing access to resources (Jennings, Cook & Seunarinesingh, 2021) [12]. Global organisations such as UNESCO and the World Bank have positioned ICTs as indispensable for achieving inclusive education transformation, advocating their integration to ensure equity, accessibility, and quality learning outcomes for all.

Despite these advances, persistent barriers to ICT integration remain, particularly in rural and under-resourced contexts. Manyasa (2022) [18] notes that in Kenya, ICT policy implementation is hampered by political inertia, while Graham, Kruger, and Ryneveld (2024) [11] report that half of South African SEN pupils lack access to essential ICTs and trained staff. Even in digitally advanced countries like Luxembourg, underutilisation of ICTs limits their educational impact (Lamos, Luyten & Tieck, 2023) [17]. In Zambia, challenges such as inadequate infrastructure, limited teacher training, and low awareness of ICT benefits continue to impede progress, especially in rural areas (Kalabula, 2007) [20].

Following the 2022 SDG update, there has been renewed international and national emphasis on accelerating ICT integration in education, with Zambia revising its curriculum and ICT policy, and prioritising infrastructure development for schools serving pupils with SENs. However, the effectiveness of these interventions remains uncertain, as the existence of policies does not guarantee meaningful implementation or equitable access. Notably, there is a lack of empirical research on the actual ICTs in use in the education of pupils with SEN in rural Zambia, creating a critical need for contextualised investigation.

Recent Zambian studies have explored ICT integration in general education. For instance, Chabalengula and Banda (2023) [4] focused on STEM schools, Zulu *et al*. (2025) on lesson delivery, Chabongwa (2025) [5] on learner performance, and Kaziya (2025) [13] on early childhood multimedia use, but have largely overlooked the specific experiences and needs of pupils with SENs. Against this backdrop, the present study investigates the range, condition, and ICTs in use among grade four pupils with SENs in Sinazongwe District, Zambia with a focus on stakeholder perceptions of usefulness and ease of use, and the factors facilitating or hindering or promoting their integration. The findings aim to bridge the knowledge gap and inform policy and practice to advance the SDG 2030 agenda for inclusive education in Zambia and Africa in general.

## Materials and Methods

### Theoretical underpinnings

The study is guided by the Technology Acceptance Model (TAM), which provides the conceptual foundation for understanding the behavioural and structural variables that shape ICT uptake in educational contexts of pupils with SENs. TAM is one of the most widely applied theoretical frameworks in understanding technology adoption. Originally developed by Fred Davis (1989) during his doctoral research at the University of Michigan, TAM builds upon the Theory of Reasoned Action (TRA) by Fishbein and Ajzen (1975), extending it to explain user acceptance of information systems. Davis introduced two core constructs: Perceived Usefulness (PU) and Perceived Ease of Use (PEU), which influence users' attitudes toward a system, their behavioural intention to use, and ultimately, actual usage. Later refinements to TAM incorporated external variables to account for context-specific factors that shape user perceptions.

In the present study, TAM is used as a guiding framework to describe the various ICTs in use in the education of pupils with SENs in Sinazongwe district. Its constructs provide a conceptual lens for analysing how various stakeholders' school administrators, teachers, pupils, and caregivers perceive and engage with ICT tools such as computers, assistive technologies, and multimedia resources. Specifically, PU and PEU help interpret findings related to teacher and learner attitudes toward ICTs, shedding light on adoption rates, classroom practices, and the enabling or constraining conditions. By applying TAM, the study not only categorises technologies in use but also identifies key behavioural and contextual factors influencing successful ICT adoption in education settings. Furthermore, TAM allows the study to distinguish between the acceptance of ICTs in well-resourced urban schools versus under-resourced rural environments, providing a nuanced understanding of facilitating conditions, digital readiness, and policy responsiveness across contexts.

### Methodology

The study rides on a qualitative methodology with a descriptive case study research design. The population comprised of Officers from; District Education Board Secretaries (DEBS)-Sinazongwe and Provincial Education Officer (PEO)-Southern, school administrator, ICT specialists, teachers, parents and pupils with SENs. It used heterogeneous purposive sampling type to select representatives from; PEO, DEBS, administrators, ICT specialists, teachers and pupils. Quota sampling was used to select parents of pupils with SEN. The total sample was twenty-seven (27). In order to meet the objectives of the study, three instruments for data collection were used, these include observation guide, focus group discussions guide, and semi-structured interviews guide. Data was analysed thematically.

## Results

### A) ICTs in use among grade 4 pupils with SEN in Sinazongwe district, Zambia

Findings from interviews, focus group discussions, and classroom observations revealed that a variety of ICTs are being utilized to support the education of pupils with Special Educational Needs in Sinazongwe District. These tools ranging from general-purpose computing devices to specialised assistive technologies are used across school and home settings with varying degrees of availability and integration. Participants highlighted how tools such as desktop computers, laptops, tablets, smartphones, smart

televisions, DVDs, projectors, and public address systems were deployed alongside assistive devices like Braille machines, hearing aids, talking calculators, and screen-reading software (e.g., JAWS, FSReader, Mwabu Reader). The excerpts below provide insight into how these technologies are used in practice.

Findings revealed a diverse range of ICT tools being used to support the education of pupils with Special Educational Needs (SENs) in Sinazongwe District. Participants highlighted both general-purpose and specialised ICTs used across school and home settings.

At the household level, mobile phones both basic and smart models were widely cited for their versatility. As DEBS1 explained, "*In our district, when it comes to the education of pupils with SENs, we also use both smart and basic phones, commonly known as big and small phones. These phones can perform many of the functions of larger computers.*" Similarly, PP1 shared, "*At home, we use the calculator on the phone to help our child, especially when doing mathematics homework*." These findings demonstrate the creative ways families with limited resources utilise everyday technologies to support learning.

In schools, more conventional tools such as desktops and laptops remain integral. PEO1 noted, "*Since I started working at the provincial office, I've seen that desktops remain a staple in schools. They're stable and reliable, enabling meaningful engagement with digital learning materials.*" Likewise, Admin2 confirmed that, *"Laptops personally owned by teachers or pupils are often used both for teaching in school and homework at home."*

Tablets emerged as another important device, especially in schools supported by donor projects. As reported by ICT Tr2, "*we use tablets that come pre-installed with disability-friendly applications like Mwabu Reader and visual audio libraries. These make learning more inclusive for pupils with SENs*".

Several multimedia tools were also reported in use. ICT Tr1 highlighted that, "*Some schools are lucky to have smart TVs connected to the internet, phones, or flash drives. These devices let pupils engage both their audio and visual senses to support their learning*." Basic tools continued to play an important role, particularly in under-resourced schools. For instance, during a focus group discussion, Tr6 observed, "*I've used the radio several times during lessons, especially where there's no access to more advanced technology. It still works well*".

While newer technologies are being introduced, older formats such as DVDs and flash drives are still commonly used. ICT Tr1 noted, "*We sometimes store and play recorded content on DVDs for pupils to watch during lessons. Many schools still rely on DVD players, even though they're being phased out elsewhere.*" For content storage and portability, Tr1 added, "*Because I don't own a personal computer, I store my teaching materials on a flash drive. It's easier that way. I just plug it in when needed*".

Additionally, digital submission of assessments is increasingly common. One teacher reported, "*We're also required to submit practical exam papers in soft copies using CDs. That's part of how we send materials to the marking centres."*

Computer laboratories are available in some schools, albeit with varying levels of functionality. According to DEBS1, *"We do have computer laboratories in the district, but not all of them are fully equipped. Still, they are used to support SEN education wherever possible*." This was confirmed by Tr1, who stated, *"Yes, some schools have computer labs that pupils with SENs use, though their functionality can be limited depending on the equipment available*".

Regarding internet access, connectivity remains inconsistent. As ICT Tr1 explained, "*Schools depend on whatever network works best in their area. Some use Airtel, Zamtel, or MTN, but schools near the Zimbabwean border sometimes rely on Zimbabwean networks*".

From these results, the following themes emerged: (i) computers, (ii) multimedia tools and education content delivery systems, (iii). Assistive devices and software, and (iv) communication platforms.

**B) Perceptions towards ICTs in use among grade 4 pupils with SENs**

Building on the reported use of ICTs in both school and home settings, this section explores how teachers, administrators, and parents in Sinazongwe District perceive the integration of ICTs in the education of pupils with Special Educational Needs. Guided by the Technology Acceptance Model (TAM), the discussion focuses on two key constructs: Perceived usefulness and perceived ease of use.

Several participants strongly endorsed the value of ICTs in enhancing the learning environment for pupils with SENs. For example, Tr1 shared a significant shift in practice: "In the past, before the widespread use of ICTs, teachers like myself with visual impairments had difficulty accessing the syllabus. We relied on sighted colleagues to read for us so we could transcribe into Braille for our pupils. But now, with various ICTs, we access the syllabus independently without troubling anyone". This narrative highlights how assistive technologies have not only empowered teachers but also improved autonomy in instructional material access an affirmation of perceived usefulness. Tr3 reflected on how ICT integration has fostered creativity and learner agency: *"ICTs have completely changed the way we plan, teach, and assess. They have enabled pupils with SEN to become creators, not just consumers. I recall one of my learners designing a digital birthday card for a teacher. It was so fulfilling to see ICT being used to express original thought."*

Similarly, ICT Tr2 commented on the long term developmental relevance of ICT use, stating: "*ICTs are very important for our pupils with SENs. They help develop essential skills, especially computer literacy, which is a necessity in today's world*". Such reflections indicate participants' recognition of technology as a bridge to broader competencies beyond academic content.

On the other hand, other participants focused on usability features. For example, observational data showed that most digital devices used in classrooms were intuitively designed, with simplified navigation interfaces, clearly labelled icons, and in some cases, multilingual options. These features made the technology accessible to learners with a range of sensory, cognitive, and physical impairments. Tr5 reinforced these observations by saying; *"ICTs are very user-friendly. Their design makes them easy for both teachers and pupils to navigate, which increases the chances of continued use during lessons*". Tr4 added that prior familiarity bolstered learner confidence: *"Our pupils with SENs seem more comfortable using technologies they've interacted with before. Repeated exposure builds comfort and independence."*

These verbatim and observations made, formulated the following themes; (i) perceived usefulness, (ii) Perceived Ease of Use, and (iii) Combined Perceptions.

**C) Factors influencing ICT Uptake among grade 4 pupils with SENs**

The study identified a range of interrelated factors concerning the ICTs in the education of pupils with Special Educational Needs in Sinazongwe District. These findings were substantiated through interviews, focus group discussions, and classroom observations: For example, Admin 1 said: *"Because we have pupils with SENs, our school was considered for ICT support from government departments, specifically ZICTA. However, not all schools received this support. Those without or with very few pupils with SENs were omitted*". [14/03/24]. Researcher Observation indicate that, the types of ICTs procured and implemented by schools were closely tailored to the specific profiles of pupils with Special Educational Needs. Schools with larger populations of SEN learners demonstrated greater availability and utilisation of ICT resources. ICT Tr1 pointed out that, "*Schools accommodating pupils with SENs in our district are making significant investments in ICTs. The Ministry of Education and the Curriculum Development Centre have emphasized the integration of ICTs at all levels, prompting both school administrators and teachers to prioritize ICT availability in classrooms*".

Researcher Observation show that, Classroom observations and a review of school log books confirmed that some schools received donated ICT equipment from government and cooperating partners, ensuring basic ICT infrastructure was in place. ICT Tr1 explained that, *"When it comes to teaching or integrating ICTs, I work with pupils with SEN at a special school and am occasionally consulted to provide guidance. However, I would estimate that at least 90% of teachers do not utilize ICTs in direct instruction for pupils with SEN. They primarily use ICTs for lesson planning, such as typing and printing teaching materials, but seldom integrate technology into their actual teaching processes*".

PP1 had this to say, *"I am aware of the importance of supporting my child with SEN by securing ICT tools, but when I inquired about the cost, it is far beyond what I earn. I also have other children to care for, making it impossible to prioritize ICT procurement. Knowing the role ICTs play in education, I try to make use of whatever technology we have at home, but I believe financial constraints are a major reason why many parents have not purchased specialized ICT tools for their children with SEN."* DEBS1 further said, *"The Zambian government has facilitated the purchase of disability-specific ICTs through grants allocated to schools. These grants allow schools to select ICTs based on pupils' needs. Since the introduction of these grants, schools have acquired numerous ICT tools for pupils with SEN. The grant allocations follow specific directives, including 25% for curriculum and material development, 15% for infrastructure, and 15% for assessments, enabling flexibility in ICT procurement*" [23/03/24].

These Key findings pointed to the following themes as factors such as; (i) SENs demographics, (ii) Policy frameworks and implementation, (iii) ICT infrastructure, (iv) Teacher expertise and technical confidence, (v) Financial constraints, (iv) Government support and strategic partnerships.

**Discussion**

**A) ICTs in use among grade 4 pupils with SENs in Sinazongwe, Zambia**

**(A) Computers and Related Devices**

The findings reveal that various computing devices, including desktop computers, laptops, smartphones, and tablets, are in active use across schools in Sinazongwe District. Mobile phones due to their affordability and portability emerged as the most commonly used computing device. However, disparities exist in device quality, age, and whether devices are equipped with assistive software such as JAWS or FSReader example for pupils with visual impairments.

These findings support previous research by Bwalya (2023) [3], which identified computers and mobile phones as frequently used ICTs in Zambian classrooms. Similarly, Khan *et al*. (2015) [14] associated the use of computing devices with improved educational outcomes for learners with SENs. However, as Simui *et al*. (2017) [22] rightly noted, the challenge lies not in mere availability, but in the lack of specialized configurations that meet specific SENs of pupils mirroring conditions in Sinazongwe.

The presence of computing devices reflects positive attitudes toward ICTs, shaped by perceived usefulness in facilitating content access and perceived ease of use for routine tasks such as lesson planning. However, the lack of disability-friendly software on most devices limits their functional utility for pupils with SENs.

**(B) Multimedia Tools and Content Delivery Systems**

Smart televisions, radios, DVD players, projectors, and public address systems emerged as essential multimedia tools used to support curriculum delivery. These devices enable multisensory instruction, essential for learners with visual, auditory, and cognitive impairments.

These findings corroborate the work of Guan *et al*. (2018), who emphasized the educational value of multimedia formats. The use of audio-visual content and broadcast lessons in Sinazongwe resonates with practices acknowledged in rural Nigeria and India. However, as Abdulrahaman *et al*. (2020) [1] suggest, the full impact of these tools is often undermined by inadequate training and irregular access observed challenges in Sinazongwe as well.

For both teachers and pupils, these tools possess high perceived ease of use, especially radios and televisions. Their usefulness is demonstrated by their effectiveness in improving learner engagement and content comprehension. These tools also require fewer technical skills, contributing to their popularity in under-resourced schools.

**(C) Assistive Devices and Software**

A variety of assistive devices including Braille machines, hearing aids, headsets, talking calculators, and digital scales were observed and reported to be in use. Software tools including JAWS, Mwabu Reader, Let's Read, FSReader, and EPTS were also recorded, aiding pupils particularly with visual and reading difficulties.

These findings align with those of Simui *et al*. (2017) [22], both of which documented assistive technologies across Africa and Asia. However, while past studies were often descriptive or institutionally narrow, this study provides compelling evidence of classroom-level integration across disability categories and education levels.

Assistive devices such as JAWS and the Let's Read app are viewed as highly useful, given their ability to support autonomous engagement with learning materials. However, some tools particularly screen-reading software requires technical proficiency, which negatively affects perceived ease of use in schools lacking adequate training.

**(D) Communication Platforms**

Communication applications such as WhatsApp, instant messaging, and Zoom support teacher collaboration, parent-teacher communication, and the coordination of inclusive education activities. However, Zoom is primarily limited to administrative use due to internet constraints.

These findings support observations by Nussbaumer and Deuss (2024), who emphasized the importance of home-school consistency and the role of communication technologies. However, unlike findings in developed contexts (e.g., Sarah, 2024), Sinazongwe's use is restricted to adult stakeholders, with little direct involvement of pupils due to infrastructural limitations.

Communication apps are deemed both easy to use and highly effective by teachers and administrators. Their mobile-based nature increases accessibility in rural areas with inconsistent internet access.

**B) Perceptions Towards ICTs in use among grade 4 pupils SENs**

**I. Perceived Usefulness**

Participants overwhelmingly described ICTs as critical tools for modern and inclusive education. They cited the following benefits: Improved access to the curriculum, development of digital literacy and problem-solving skills. Enhanced engagement and interaction during lessons, increased creativity among pupils and teachers. And better record-keeping and tracking of pupil performance

These findings corroborate research by Vega-Gea *et al*. (2021) [23] which emphasized the enabling role of ICTs in inclusive classrooms. The perceptions suggest that teachers are intrinsically motivated to integrate ICTs when they see concrete pedagogical returns.

**II. Perceived Ease of Use**

ICTs such as mobile phones, radios, tablets, and projectors were praised for simplicity in operation, intuitive design, touchscreen responsiveness, and visual clarity. Assistive compatibility features such as read-aloud functions and accessible font options also enhanced user experiences for pupils with SENs.

These findings reinforce those by Sahin and Simşek (2024), where self-efficacy and low cognitive demands facilitated adoption. Teachers expressed greater willingness to adopt technologies they were familiar with, supporting the TAM construct of ease of use leading to attitude formation.

**III. Combined Perception: Usefulness and ease of use**

A subset of participants reported that certain ICTs were both highly useful and easy to use, affirming that this convergence strengthens attitudes and intentions toward use. A key proposition of TAM which was validated in this rural context.

Empirical evidence on Perceptions towards ICTs in the education of pupils with SENs in Sinazongwe District were overwhelmingly positive, with teachers, administrators, and parents recognising these technologies as critical for enhancing curriculum access, learner engagement, and creative expression. Participants highlighted both the usefulness of ICTs such as enabling independent access to materials and fostering essential digital skills and their ease of use, citing intuitive design and accessible features as key facilitators of adoption. These findings, consistent with the Technology Acceptance Model (TAM), suggest that when ICTs are perceived as both valuable and user-friendly, motivation for integration is high. However, the extent to which these positive perceptions translate into sustained use is shaped by a range of contextual factors. This called for the need to examine the specific barriers and enablers that influence ICTs use in education of pupils with SENs, which the researchers focused in the next section.

**C. Factors Influencing ICT Uptake for SENs**

**SEN Demographics Influencing ICT Availability**

One of the most salient findings was that ICT investments across schools were often driven by the presence and severity of SENs among enrolled pupils. Schools hosting a larger proportion of pupils with physical, sensory, or learning challenges were more likely to receive ICT tools, often through targeted NGO or government interventions. This demand-based allocation was echoed by administrators and teachers who proactively lobbied for ICT donations based on identified SENs.

This aligns with findings from Turgut and Aslam (2021), who argue that resource allocation in inclusive education systems frequently correlates to perceived demand and visibility of learners with specific needs. Under TAM, this highlights high perceived usefulness, as teachers and administrators recognise ICTs as essential tools to bridge accessibility gaps. However, disparities in access driven by SEN enrolment statistics pose ethical concerns by reinforcing inequities in schools without visible SEN demographics. The model's external variables, particularly facilitating conditions, remain contingent on administrative decisions rather than consistent policy enforcement.

**Policy Frameworks and Implementation Gaps**

National ICT policies emerged as important enablers of ICT integration. The 2006 National ICT Policy, 2023 revision, and the draft ICT in Education Policy explicitly mandate ICT adoption in schools, including specific SEN provisions. These policies have provided legitimacy and infrastructure guidelines supported by institutions such as ZICTA and the Curriculum Development Centre. While these policy frameworks resonate with Chirwa and Mubita (2021) [6], who emphasise the importance of institutional mandates for successful ICT integration, the current study reveals notable implementation gaps, especially in SEN specifications. ICT Tr2 and others noted that policies do not clearly guide the procurement or use of disability-specific ICTs, leaving many practitioners unsure of selection decisions.

From a TAM perspective, these limitations directly reduce perceived ease of use and behavioural intention to adopt ICTs. While policies set the foundation, the facilitating conditions for effective implementation such as school-led training, monitoring, and specification guides remain insufficiently addressed, thus limiting uptake.

**Curriculum Requirements Driving ICT Integration**

Curriculum integration has been a compelling driver for ICT investment among Sinazongwe schools. Teachers and

administrators acknowledged that the inclusion of ICTs in the 2013 and 2023 Zambia Education Curriculum Frameworks legitimised their procurement and use, particularly in delivering individualized content for pupils with SENs.

This finding aligns with global literature (e.g., UNESCO, 2021), which highlights curriculum-aligned ICT integration as essential for inclusive learning. Within the TAM framework, this curricular mandate reinforces both perceived usefulness and behavioural intention, particularly as teachers view ICTs not as optional add ONS, but as necessary for meeting learning outcomes. However, in schools lacking adequate ICT infrastructure or trained teachers, this policy expectation has translated into implementation fatigue, with teachers struggling to align curriculum directives with ground realities, thereby weakening perceived ease of use.

**ICT Infrastructure and Unequal Access**

Infrastructure related findings revealed stark disparities across schools in Sinazongwe. While some schools had modern equipment donated by NGOs or acquired through government initiatives, others operated with obsolete or non-functional devices or none at all. Frequent power outages and lack of internet connectivity were widely cited constraints. This is consistent with studies by Kala (2023), who noted that infrastructure gaps specifically electricity and connectivity habitually hinder ICT deployment in rural Zambia. TAM explains this as a breakdown in facilitating conditions, whereby even when perceived usefulness is high, adoption is limited by tangible technical barriers and insufficient on-site maintenance or support services.

**Teacher Expertise and Technical Confidence**

Teacher expertise was described as a critical determinant of ICT use. While a few teachers engaged in meaningful ICT integration, most used ICTs solely for administrative tasks. Those trained in ICT and SEN education were more confident and likely to advocate for ICT based instruction. The absence of specialised ICT teachers directly influenced the underutilization of available tools and even deterred some NGOs from making donations.

This confirms established research by Lazarous (2024), which found personal factors alone insufficient in determining ICT integration unless complemented by skills-based training. Similarly, under TAM, insufficient self-efficacy among teachers erodes both perceived ease of use and behavioral intention, reinforcing the need for ongoing professional development.

**Financial Constraints as a Barrier to ICT Availability**

Participants consistently cited high costs of disability specific ICTs as a major barrier. Tools such as screen readers, braille displays, and adaptive devices were perceived as disproportionately expensive compared to standard ICTs, limiting their procurement within constrained school budgets. Parents also struggled to afford personal devices, widening the digital divide at home.

This issue is under researched in comparative literature but reflects broader findings from Shahzad *et al*. (2024), who identify economic considerations as critical external variables under TAM. When affordability impedes access even amid high usefulness ICT adoption for pupils with SENs remains aspirational. Hence, cost structures must be addressed in both government policy and NGO procurement strategies.

**Government Support and Strategic Partnerships**

The provision of government grants, ICT donations, and teacher training initiatives supported by stakeholder partnerships enabled several schools in Sinazongwe to develop basic ICT infrastructure. Schools involved in projects such as 'Let's Read' and 'Catch Up' reported better access to devices and training.

However, the geographic dispersion of support was uneven. While schools partnering with NGOs or private agencies (such as the local mining industry) reported robust infrastructure, less connected schools remained under resourced a finding echoed by Turgut and Aslam (2021).

TAM situates this in facilitating conditions external systemic support factors required for ICT uptake. Where support is holistic and consistent, adoption improves. Yet, where access depends on proximity to donor networks or organisational capacity, national equity goals are compromised.

Overall, the study shows that perceived usefulness of ICTs in teaching pupils with SENs is uniformly high across teachers, administrators, and stakeholders. However, perceived ease of use is frequently undermined by inadequate training, outdated infrastructure, and lack of specific SENs tools. Structural conditions such as costs, technical support, policy gaps, and donor-driven inequities further shape the variable success of ICT integration.

Under the Technology Acceptance Model (TAM), successful integration hinges not only on individual intention but also on well-established systemic facilitating conditions, including affordability, leadership support, contextualised training, and relevant infrastructure. Unless these are addressed, even the most well-intentioned policies and curriculum mandates will yield uneven ICT implementation and continued educational exclusion for pupils with SENs.

## Conclusion

The findings of this study reveal a complex but promising picture of ICT uptake in the education of pupils with Special Educational Needs in Sinazongwe District, Zambia. A diverse set of technologies ranging from mobile phones to assistive software are in use, supported by a robust policy framework and growing stakeholder willingness. However, systemic barriers such as funding gaps, infrastructure deficits, and teacher skill limitations continue to hinder universal adoption. Despite these challenges, the positive perceptions and behavioral intentions identified among stakeholders form a strong foundation for targeted interventions and strategic investments. When interpreted through TAM, the findings affirm that both perceived usefulness and ease of use significantly shape ICT integration, but actual usage remains contingent on contextual variables that extend beyond the model. Thus, sustainable ICT integration requires strong facilitating conditions, including tailored policy enforcement, equitable infrastructure, and inclusive resource allocation.

## Recommendations

**For the ministry of education and policy makers**

- **Adopt SEN-Specific ICT Implementation Guidelines:** Revise current ICT and education policies

to provide clear operational guidance on the selection, procurement, and use of ICT tools tailored to diverse SEN categories.
- **Ensure Equitable Resource Allocation:** ICT grants should reflect SEN demographics and not be disbursed based solely on general enrolment figures. Rural and underserved schools should receive priority for adaptive technologies.
- **Invest in Targeted Teacher Training:** Expand Continuous Professional Development (CPD) to include hands-on training in assistive technologies (e.g., JAWS, MWABU Reader, and Let's Read Apps) and inclusive digital pedagogy.
- **Mitigate Cost Barriers:** Initiate national procurement and bulk-supply arrangements for assistive ICTs to reduce unit costs and ensure affordability for both schools and parents.

**For School Administrators**
- **Prioritise SEN ICT Planning:** Develop internal ICT plans that address the specific needs of SEN learners, including device maintenance, classroom adaptation, and assistive software licensing.
- **Leverage Community and Donor Engagement:** Build collaborations with local businesses, churches, and NGOs to mobilise infrastructure support and specialised devices for pupils with SENs.
- **Monitor and Report Gaps:** Regular school-based evaluations should assess ICT usage, barriers, and outcomes specifically for SEN learners and inform district level resource requests.

**For Teachers**
- **Build Personal ICT Competence:** Teachers should be encouraged to participate in ICT literacy programs and seek training on disability-focused technologies to foster self-efficacy and overcome resistance to ICT adoption.
- **Utilise Mobile and Low-Tech ICTs:** Where robust infrastructure is lacking, teachers can creatively integrate mobile-based platforms, radios, and preloaded tablets into pedagogy to enhance accessibility.
- **Pair ICT with Differentiated Instruction:** Teachers should use ICTs deliberately to personalise tasks based on learner profiles, following practices that support pupils with cognitive, hearing, and physical impairments.

**For Non-Governmental Organisations (NGOs) and Donor Agencies**
- **Support infrastructure development in underserved schools:** Focus donations on schools demonstrating high need and low capacity, including those without prior ICT investments.
- **Provide inclusive software and setup support:** Donations should include licensed assistive software and technical assistance for local installation, teacher training, and maintenance.
- **Monitor impact beyond access:** Evaluation frameworks should assess not only the number of devices donated but also their ongoing use, impact on learners, and challenges faced in implementation.

**For Parents and Community Members**
- **Promote home-based ICT Use:** Where possible, parents should be supported to engage their children with ICTs at home using affordable tools such as mobile phones, especially for continued learning.
- **Participate in inclusive school governance:** Parents of learners with SENs should be included in school committees related to ICT planning and resource management to advocate for their children's needs.

**For Research and Academia**
- **Undertake Longitudinal Studies:** Future research should track ICT usage trends across time among pupils with SENs to understand long-term outcomes and sustainability of interventions.
- **Explore Pupil-Level Experiences:** More in-depth qualitative work is needed to capture the voices of pupils with SENs about their engagement with ICTs, a dimension often missing in existing documentation.

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**Conflict of interest**
There is no conflict of interest for this paper

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