

Accessibility and Use of ICT-Based Learning Tools in Special Schools in Bangladesh

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Abstract

The incorporation of Information and Communication Technology (ICT) tools is considered as an effective practice to offer a wide-ranged learning experience for the students with special needs. However, the access and usage of digital technologies is a less explored area in the context of special schools in Bangladesh. This qualitative study aimed to investigate the effective practice of using ICT tools as well as explore the barriers in integrating the tools in instruction. In this research, 20 special educators were selected as study participants purposefully. Semi-structured interview was employed to generate findings. The study found usage of utilizing digital tools in several aspects that includes digital visual assistance, academic support, and speech and hearing support. The study identified some challenges in integrating digital resources in instruction which are: misconceptions and limited understanding, language barrier, unavailability of resources, financial challenge, perceived complexity, disparity between urban and rural setting, and insufficient teacher and staff training. These findings indicate the need of initiating policy-level support, field-level training and logistical support. The study will be helpful in understanding and establishing evidence-based practice on integrating ICT-based tools in instruction that will ensure a more concrete learning experience for students with special needs.

Keywords: ICT, Access, Usage, Challenges, Teachers, Special schools

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1. Introduction

In this era, Information and Communication Technology (ICT) has become an essential component of modern education systems and it has a vast influence particularly within the field of special education. ICT-based learning tools, including assistive technologies, interactive multimedia applications, and adaptive communication systems, are increasingly being adopted to support learners with disabilities. These tools are designed to improve access to learning content, reduce educational barriers, and promote greater participation of children with special needs in classroom activities (UNESCO, 2012; G3ict, 2018). The role of ICT in special education is closely linked with the broader global movement toward inclusive education. Inclusive education emphasizes that all

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learners, regardless of physical, cognitive, sensory, or developmental challenges, should have equal opportunities to participate in quality learning environments. Within this framework, ICT acts as a key enabling tool by offering alternative methods of instruction and communication that accommodate diverse learning needs (Yenduri et al., 2023). For example, screen readers assist visually impaired learners, while speech-to-text applications and augmentative communication devices support students with hearing or speech impairments.

Empirical evidence suggests that ICT integration in special education can significantly enhance learning engagement and cognitive development. Digital learning environments often combine visual, auditory, and interactive elements, which are particularly effective for learners with autism spectrum disorder, intellectual disabilities, and learning difficulties. Such multimodal instruction allows students to process information at their own pace and receive immediate feedback, which strengthens understanding and retention (Sharma et al., 2023). According to global estimates, more than one billion people are living with some form of disability, many of whom continue to experience barriers in accessing quality education (World Health Organization, 2023). Although ICT has the potential to reduce these barriers, its effectiveness is uneven due to disparities in infrastructure, affordability of assistive devices, and lack of trained educators in many regions. As a result, the benefits of digital learning tools are not yet fully realized in many educational systems, particularly in low- and middle-income countries (UNESCO, 2012; Yenduri et al., 2023). Furthermore, ICT supports the principles of Universal Design for Learning (UDL), which encourages the use of flexible instructional methods to address diverse learner needs. Through ICT-based approaches, educators can provide multiple forms of representation, engagement, and expression, thereby fostering more inclusive learning environments. This not only improves academic participation but also enhances independence and social interaction among learners with disabilities (Asula-Abaver & Machaba, 2026).

In addition to academic benefits, ICT plays an important role in developing life skills among children with special needs. Access to digital tools can improve communication abilities, digital literacy, and functional independence, which are essential for future employment and social integration. However, the successful application of ICT in special education depends heavily on institutional readiness, teacher competence, and the availability of appropriate technological infrastructure (Fakrudeen et al., 2017).

In Bangladesh, the development of special education has gradually gained attention over the past few decades, particularly with increasing recognition of inclusive education as a national and global priority. Government and non-government initiatives have contributed to the establishment of special education institutions, resource centers, and inclusive education programs. However, despite these efforts, the integration of Information and Communication Technology (ICT) in special education remains in its early stages and is unevenly implemented across institutions (Directorate of Secondary and Higher Education [DSHE], 2020; UNESCO, 2017). Bangladesh has made notable progress in expanding digital infrastructure aiming to integrate technology into governance, education, and public services. In the education sector, initiatives such as

multimedia classrooms, digital content development, and online learning platforms have been introduced in mainstream schools. However, the adaptation of ICT specifically for children with special needs has not progressed at the same pace, and many special education institutions still rely heavily on traditional, non-digital teaching methods (Islam & Grönlund, 2011).

Although ICT tools such as computers, tablets, and multimedia resources are increasingly available in urban educational settings, their accessibility in special schools remains limited. Studies in developing contexts, including Bangladesh, suggest that infrastructure constraints, lack of assistive technologies, and insufficient teacher training are major barriers to effective ICT integration (Alam & Taposhi, 2021). In many cases, even when devices are available, they are not specifically designed or adapted for learners with disabilities, reducing their educational effectiveness. In practice, even when ICT tools are available, their accessibility and usability for children with special needs are often limited. Assistive technologies such as screen readers, speech-to-text systems, and augmentative communication devices are not widely implemented or properly integrated into classroom teaching. Furthermore, insufficient institutional support hinders effective utilization of ICT in special education classrooms (Rahman & Sultana, 2022).

The digital divide is particularly pronounced in special education settings. Students with disabilities often face compounded disadvantages due to both their educational needs and limited access to adaptive technologies. For example, children with visual impairments require screen readers or braille-based digital systems, while learners with hearing impairments depend on captioning tools and visual learning platforms. However, such assistive technologies are not widely available or consistently implemented in many Bangladeshi special schools (Rahman & Sultana, 2022).

Teacher preparedness is another critical factor influencing ICT use in special education. Although general ICT training programs exist for teachers in Bangladesh, specialized training focused on assistive technologies and disability-inclusive digital pedagogy remains limited. As a result, many educators lack the confidence and technical skills needed to effectively integrate ICT into their teaching practices for learners with special needs (Hossain & Sarker, 2020). This gap directly affects the quality of instruction and limits the potential benefits of digital learning tools. Furthermore, institutional and policy-level challenges also hinder the widespread adoption of ICT in special education. While national education policies emphasize inclusive education, implementation frameworks often lack clear guidelines for assistive technology integration. Budget constraints, uneven distribution of resources between urban and rural areas, and limited maintenance of ICT equipment further contribute to inconsistent usage (UNESCO, 2017). These systemic issues highlight the gap between policy intentions and classroom realities.

Despite these challenges, there are emerging opportunities for improving ICT integration in special education in Bangladesh. Non-governmental organizations (NGOs) and international development partners have introduced pilot projects focusing on digital accessibility and inclusive learning technologies. Additionally, increasing availability of low-cost digital devices and mobile-based learning applications presents new possibilities

for expanding access to education for children with disabilities. However, the effectiveness of these initiatives depends on sustained implementation, teacher support, and institutional readiness.

Overall, the current situation in Bangladesh reflects a transitional phase where ICT has been partially introduced into the education system, but its application in special education remains limited and inconsistent. This gap highlights the need for systematic investigation into the accessibility and actual usage of ICT-based learning tools in special schools, which forms the central focus of this study.

In the context of Bangladesh, existing research on ICT in education has primarily focused on mainstream schools, digital classrooms, and general ICT integration under national education policies. Very limited empirical research has specifically examined how ICT-based learning tools are accessed and used in special schools. Even fewer studies have explored the perspectives of teachers and students regarding the practical challenges of implementing such technologies in real classroom environments (Hossain & Sarker, 2020; UNESCO, 2017).

Moreover, most available studies tend to focus on policy-level discussions or general access to ICT, rather than detailed classroom-level analysis of usability, accessibility, and actual usage patterns among children with different types of disabilities. This creates a clear research gap in understanding the actual availability of ICT-based learning tools in special schools. There is also a gap in knowledge on how accessible these tools are and what extent they are being used. Finally, the actual scenario of barriers faced by educators and learners also needs to be explored.

1.1 Theoretical Framework

This study is guided by two complementary conceptual lenses: the Social Model of Disability (Oliver, 1983) and Bronfenbrenner's Ecological Systems Theory (1979). The Social Model of Disability frames disability primarily as a product of environmental and attitudinal barriers rather than an individual deficit, positioning ICT-based tools as a means of removing such barriers by adapting instructional content and delivery to learners' needs rather than expecting learners to adapt to inaccessible materials. Ecological Systems Theory complements this by situating the use of ICT within nested layers of influence: the microsystem of the classroom and teacher-student interaction, the mesosystem of school-level resource allocation and administrative support, the exosystem of institutional type (government, NGO, or private) and community infrastructure, and the macrosystem of national policy and funding priorities. Together, these frameworks provide a basis for interpreting the findings not simply as isolated classroom-level observations but as outcomes shaped by overlapping social, institutional, and policy-level conditions, and they are used throughout the Discussion to connect specific findings to the broader systems in which they are embedded.

Therefore, this study addresses this gap by exploring the accessibility and use of ICT-based learning tools in special schools in Bangladesh, contributing empirical evidence that can inform policy, teacher training, and inclusive education practices. The objectives of the study are outlined below:

- a. To examine the availability and accessibility of ICT-based learning tools for children with special needs in selected special schools in Bangladesh.
- b. To identify the existing challenges related to the effective use of ICT-based learning tools in these schools.

2. Methodology

The present study adopted a qualitative research design to explore the accessibility and use of ICT-based learning tools in special schools in Bangladesh, with a focus on capturing in-depth perspectives from practitioners directly involved in the teaching process. A purposive convenience sampling strategy was employed to select participants from a range of special education institutions, including both government and non-government schools, as well as urban and semi-urban settings, to allow for variation in institutional context. A total of 20 teachers working with children with diverse disabilities were included in the sample. Participants were selected based on their direct experience with teaching special needs students and their familiarity, whether limited or extensive, with ICT-based tools in classroom practice. This variation in experience was intended to provide a broader understanding of both access and usage patterns across different educational environments. Institutions were selected purposively to ensure representation across ownership type (government, NGO, and private) and location (urban and semi-urban), and then by convenience based on which schools were accessible to the research team and willing to participate within the study timeframe. Only teachers were recruited as participants; parents, students, and school administrators were not included, so the findings reflect teachers' perspectives specifically and do not capture how other stakeholders experience ICT accessibility and use.

Table 1

Demographic and Professional Characteristics of Teacher Participants (N = 20)

<i>Variable</i>	<i>Category</i>	<i>Frequency</i>
Gender	Male	10
	Female	10
Institution Type	Government	7
	NGO	7
	Private	6
Location	Urban	10
	Semi-Urban	10
Teaching Experience	3–5 years	6
	6–9 years	8
	10+ years	6

<i>Disability Focus</i>	Autism Spectrum Disorder	5
	Hearing Impairment	4
	Intellectual Disability	5
	Visual Impairment	3
	Learning Disabilities	3

Data were collected through semi-structured, in-depth interviews, allowing participants to reflect on their experiences, challenges, and perceptions regarding the use of ICT in special education. The interview questions were designed to gain in-depth insights on the availability of ICT tools, their accessibility for different learners, classroom usage practices, and the barriers that influence effective implementation. All interviews are conducted in a flexible manner to encourage open responses, recorded with consent, and transcribed verbatim for analysis. The collected data are analyzed using Braun and Clarke's (2006) six-phase thematic analysis approach: familiarization with the transcripts, generation of initial codes, searching for candidate themes, reviewing and refining themes, and defining and naming the final themes reported below. Coding was carried out manually rather than with qualitative analysis software, given the moderate size of the dataset. This approach enables the study to move beyond surface-level descriptions and develop a deep understanding of how ICT tools are experienced in real classroom contexts, while exploring the accessibility and practical use in special education settings in Bangladesh.

This research was conducted in accordance with established ethical standards, and received prior approval from the Institutional Ethical Review Committee of the researchers' affiliated university. Participants were provided with detailed information about the study's objectives and procedures, and written informed consent was obtained prior to data collection, ensuring voluntary participation and the right to withdraw at any time without consequence. Confidentiality and anonymity were strictly maintained, with no personally identifiable information disclosed, and all data were securely handled and used solely for academic purposes.

3. Findings

The study found several effective practices as well as challenges in utilizing ICT-based tools in instruction. These are presented below.

3.1 Current practices of ICT based tools

The present study identified several practices involving digital technologies that professional use in the classroom. These techniques assist the overall teaching-learning process in many dimensions.

3.1.1 Digital visual assistance

Visual cues are considered one of the most effective ways to draw the attention of the learners with special needs. Materials or tools used in their teaching learning process

should also be visually enriched. Visually supportive applications can make learning more enjoyable for students and help teachers prepare their materials more effectively. Participants in this study have also reported that they frequently use those visually supportive applications to create class schedules, task organization and many other purposes. In this regard Respondent 7 mentioned,

“Learners with autism benefit from the use of visual schedules. Multiple apps are used to design well planned and organized visual schedules for them to be mentally present and prepared for their further activities.”

Some participants mentioned that, students with visual limitations can also benefit from these ICT-based learning applications. Some applications are specially designed to accommodate students’ visual capabilities and provide additional sensory supports.

Respondent 3 mentioned in this regard that,

“Some neurodiverse student also have visual limitations like low vision. I think using an application like a visual magnifier can make their reading experience smoother. These types of applications zoom in on any view or increase the font size to make the text more readable to the readers.”

Across these accounts, visually supportive tools serve two related but distinct functions in this sample: structuring time and sequencing tasks for learners with autism, and improving text legibility for learners with low vision, which suggests visual ICT support is being applied flexibly across different visual-processing needs rather than as a single generic solution.

3.1.2 Academic support

The majority of the respondents agreed the fact that ICT-based tools are highly effective for the academic advancement of learners with diverse academic needs.

A respondent mentioned that,

“Students who have ASD or ADHD tend to be slow learners. A Reading buddy app can help them read easily and can give summarization of any reading material. But as we can see, none of my student are currently using it.”

Teachers identified digital materials as an effective way of improving students’ attention.

Among them, a teacher stated that,

“Many of our students get distracted during class lectures. Using digital materials in class can grab their attention better. Some of our students are also fond of gadgets, and we can use this aspect in teaching.”

3.1.3 Speech and hearing support

Teachers emphasized the need for audio materials for learners who take longer to learn. The various learning and memorization features of these apps can help them learn easily.

Respondent 11 stated that,

“My students are unable to learn things they hear once. Digital learning tools can help

them listen repeatedly and memorize better.”

Some participants identified digital tools as very useful for learners with various speech disorders.

One of them reported that,

“Some digital applications based on artificial intelligence are specially designed to help students with speech language disorders. We can use speech recognition, text to speech, speech to text, slow motion video etc.”

Together, these examples show AI-driven speech tools being used for two purposes: repeated listening to support memory, and real-time speech-text conversion to support students with speech-language disorders.

3.2 Challenges of using ICT-based tool

Incorporating ICT-based learning materials in teaching-learning process demands well planned preparation. Scattered implementation of digitalization may lead to several relevant challenges associated with it. Participants mentioned about various challenges they face in this regard, including a lack of proper ideation, technical errors, unavailability of resources and funding etc.

3.2.1 Misconception and Limited understanding

Professionals reported several misunderstandings and misconceptions among parents, authorities and teachers regarding the use of digital tools in schools and children’s to use of digital gadgets.

Among them, a teacher mentioned,

“In my opinion, the main challenge of using ICT-based tools in schools is the misunderstanding of parents and teachers. They can’t get out of the idea that devices can only harm their children.”

These misconceptions were reported as extending beyond parents to colleagues as well; another participant noted that similar attitudes exist among teachers themselves,

“Many of our teachers also think that using technology or AI tools can cause our students to become addicted to devices or interested to negative content.”

3.2.2 Language barrier

Students with different characteristics may find generalized language difficult to use. Formal or foreign language can create obstacles for struggling students, especially exceptional children.

One of the respondents noted in this regard that,

“All of the ICT-based tools are English language based. If we can introduce those in students’ native language, it would be easier for them to use.”

Another teacher added to this and said,

“We provide instructions to our students in clear and simple language. Complex and

unfamiliar terms of these sites make them hard for our students to use.”

3.2.3 Unavailability of resources

Teachers expressed concern that the unavailability of expected resources hinders progress in using digital materials in the classroom.

Respondent 5 noted that,

“These types of tools are not sufficiently available in our surroundings yet. Even most special educators are not aware of them. I think parents lack adequate support from the school in this matter.”

The lack of internet facilities was identified as a major obstacle by teachers. The majority of participants agreed with this point.

One of the respondents also identified the lack of proper digital infrastructure as a barrier to ensuring digitalization in teaching and mentioned that,

“Our network system is very weak. Schools can’t afford high speed internet and the devices they require. Even the infrastructure is sometimes inadequate.”

In this context, some teachers suggested that broader digitalization of special schools, beyond individual classrooms, would help address these resource gaps by giving more students consistent access to the tools they need.

3.2.4 Financial challenge

A common concern among participants was the lack of proper finding and budget. Among them, one of the respondents mentioned,

“We have Poverty issues among families of our students. This makes us helpless in many situations even if we plan our best for our students.”

Another teacher added that,

“Some tools require money for subscription or are paid versions. Most parents think it is a waste of money, as they are spending enough on schooling and therapy sessions.”

3.2.5 Perceived Complexity

Another fact revealed by the participants was that the features of these applications are often complex for them as well as for children with special needs. Although these tools can be used with guidance of parents and teachers, students find it difficult to use them independently. In connection with this, one of them stated,

“The features of the tools should be easier to use. I mean to say that tools should be designed in such a way that everyone can use it easily. Especially students with special needs require easier and simplified content.”

Another participant added,

Teachers’ recommendations offered relevant solutions to this challenge including setting difficulty levels according to students’ capabilities and conditions. Regarding this, one of them suggested that,

“App designers can create different versions of content where different difficulty levels and variations are included. It will help our students use topics that are suitable for them.”

3.2.6 Disparity between urban and rural setting

Discrepancy between the rural and urban schools create gaps in existing digital facilities. This leads to an imbalance in the services students receive in both contexts.

Teacher 1 reported that,

“Schools in rural areas and villages are not receiving enough facilities. We face limitations in internet access. We are also not able to use all kinds of necessary devices either. These are creating backwardness in the use of the latest technology.”

Schools in Dhaka city sometimes arrange training for their teachers, but teachers in rural schools are not getting enough training in technological skills.

“We need to make a plan to create classroom digitalization all over the country and in every school. If we can move beyond Dhaka based thinking, there is a chance that all students will benefit from this.”

3.2.7 Insufficient teacher and staff training

Well-trained and technologically efficient manpower are a precondition for ensuring digitalization in schools. Teachers also mentioned that many of them are not specifically trained to handle diverse learners. Most participated this as barrier to creating digital classrooms and serving children with special needs. In this regard, respondent 16 mentioned,

“All teachers are not properly trained to handle special need children. Some teachers complete a six-month diploma course and enter this profession. This is definitely a major challenge when it comes to providing special facilities like AI or digital classroom for the students.”

This shortfall was echoed by other participants, who described current ICT use in special-needs teaching as still experimental rather than embedded practice.

Teachers also highlighted the government initiatives taken for ICT integration and digital inclusion. Respondent 7 stated that,

“Some initiatives have also been taken in these regards by the state parties. If I have to mention some, I can say about A2I, digital inclusion and inclusive university are some initiatives planned by our government for inclusion in our country.”

4. Discussion

4.1 ICT Practices in Special Education

This study revealed diverse range of practices of ICT-based approaches in teaching-learning process in the special schools of Bangladesh. Firstly, the study respondents reported digital visual assistance tool as an impactful tool that helps them to offer the students a wide array of learning scopes with the use of visual cues. For instance, various types of visually supportive applications are being used for the students who are visual

learner. Moreover, visual applications ease special educators' complexity on material preparation as well as organizing class activities with high efficiency. This finding is in line with previous study (Wyeth et al., 2023) which found positive outcomes of digital visual tools' usage. Similarly, another research (McClannahan and Krantz, 1999) indicated that use of visual cues by helps the learners to engage in with the flow of activity. Besides, these tools are customizable as it recognizes the learners' needs and offers multisensory learning scopes that actively engage the learners in teaching-learning process (Restianty et al., 2024; Sharma et al., 2023). On the other hand, the present study indicated that the use of ICT based tools ensures academic support in several dimensions. For instance, the study reported enhanced attention of the students in the learning process by using digital tools as these contains visually stimulating elements that can also provide breaks from monotonous teaching-learning process. Besides, some apps can help the students in engaging with reading more efficiently as those apps organize and summarize the contents and offer easily comprehensible lectures. This finding is aligned with several research (Prabhu et al., 2023; Duque et al., 2024; Tobin & Behling, 2021) that indicated that the use of digital tools promotes autonomy and active participation and social interaction. Besides, these tools assist learners to progress meaningfully in reading and writing. In addition, Prabhu et al. (2023) concluded that these technologies help the visually impaired students in gathering knowledge and concepts similarly as the students without disability which reflect students' equal learning opportunities that is shaped by digital assistive tools.

The current study found that the special schools use digital tools such as application, software and smart device as an integral part of teaching-learning process for the students who have hearing or speech related issues. In addition, the participants recognized the importance of these tools as a 'great assistance' to the students with special needs from several perspectives. In specific, the study explored that the special schools use these tools as alternatives for lectures as well as a supplementary material for the students who have attention related issues. This finding is supported by several research from various country context (Karunamoorthy et al., 2020; Kiagia, 2025) signifying the digital tools' positive impact on students' learning by establishing independent learning climate, broadening accessibility of learning materials, allowing them applying knowledge in practical life setting and also promoting social inclusion of the learners with disability. Similarly, the ICT-based tools bridge to informal learning through apps, smart devices and software that broaden the scope of personalized learning for the students with disability (Rathore, 2025). These alignments between the present study findings and previous research findings indicate a strong impact of ICT-based tools on the learning of the students with special needs.

4.2 Institutional and Systemic Barriers

Apart from the usage and access of ICT-based tools in special schools, this study revealed several challenges that are reported by the study participants. First of all, the study identified misconception and a limited understanding of teachers, parents and supporting staff on digital tools which hindered the implementation of effective digital tools in teaching-learning process in special education setting. Due to limited

understanding, both parents and teachers don't utilize these tools. Echoing with this finding, Kiagia (2025) revealed that teachers lack relevant support from the institution that makes them less confident in using digital tools in the classroom for teaching-learning purpose. Some study (Karunamoorthy et al., 2020; Masoumi, 2015) found that despite of being familiar with ICT tools, teachers mostly utilize it for preparing their teaching practice rather than integrating it completely in teaching-learning process. Another challenge identified by the present study was language barrier that impede both teachers and students in fully utilizing the digital tools as most of these tools are in English language. This is supported by Das (2020) indicating low-proficiency in English might obstruct in understanding and functioning the digital tools, specifically in rural setting. Besides, the current study showed that there is a lack of digital resources which is a major barrier in integrating digital materials in special school. Many research echoed this finding; limited resources, internet unviability, weak infrastructural setting and lack of suitable and contextualized digital resources significantly limit the scope of digital technology integration in the teaching-learning process of students with special needs (Das, 2020; Karunamoorthy et al., 2020; Oredein & Obadimeji, 2023; Puspawati & Juharoh, 2021; wanBin & Yan, 2025). Kiagia (2025) argued that teachers as well as special schools do not get necessary support from the state-level organizations which is another reason for budget constraints. In relating to this, the present study also found financial barrier as another challenge that the special schools face in offering digital materials. Due to budget limitation, special education institutes can not offer a range of digital materials. Several study (Oredein & Obadimeji, 2023; wanBin & Yan, 2025) also found similar context that mentioned inadequate funding obstructs the schools to offer high quality ICT tools.

On the other hand, the study found the perceived complexity as a major challenge in digital technology access and usage. Many teachers and students find these tools difficult to operate due to limited understanding; and therefore, they mostly use very basic-level materials. Teachers may find it complex to conceptualize and employ the digital tools in the classroom and due to lack of confidence, they might be less interested in using digital tools in the class (Karunamoorthy et al., 2020; Oredein & Obadimeji, 2023; wanBin & Yan, 2025). However, teachers' lack of motivation due to work load and inadequate remuneration also lead them to use the technologies less effectively (Kiafia, 2025). Moreover, skilled teachers don't necessarily indicate the obvious utilization of digital tools in the class because some teachers believe students might be more distracted if devices are allowed in the class. Also, there is a need to shift from conventional method of teaching to effectively integrate ICT tools in the instructional practice (Karunamoorthy et al., 2020; Starkey, 2019; Yusuf and Balogun, 2011). The present study also revealed a visible disparity between rural and urban school setting in the context of offering and utilizing digital tools which is echoed in previous research (Oredein & Obadimeji, 2023) mentioning it as a 'digital divide' that reflects the unequal access to digital technology and resources among the students with disabilities. Lastly, the study indicated the lack of training and professional development as a significant barrier in integrating digital tools in the classroom practice. Despite of having positive attitude, the inadequacy of relevant training and limited scope of continuous professional development keep the professional

less-skilled in utilizing ICT-based materials. Several studies supported this finding which revealed that the integration of ICT tools depend on the teachers' readiness as well as administrative support and the lack of sufficient training impede the teachers to fully participate in accessing and using digital tools in the class (Das, 2020; Fakrudeen et al., 2017; Oredein & Obadimeji, 2023; Puspawati & Juharoh, 2021; Rathore, 2025; wanBin & Yan, 2025). Moreover, the effectiveness of existing professional development programs should be monitor to understand professionals' efficacy in integrating ICT tools in instruction (Starkey, 2019).

Viewed through the Ecological Systems Theory introduced earlier, most of the barriers identified above sit at the exosystem and macrosystem levels institutional funding, national policy implementation, and uneven infrastructure rather than at the level of individual teacher motivation, which points to systemic rather than individual solutions. What appears more distinctly Bangladeshi in this dataset is not the barriers themselves, since language mismatch, cost, and training gaps are reported in many low- and middle-income contexts (Das, 2020; Oredein & Obadimeji, 2023; wanBin & Yan, 2025), but their specific combination: a heavily Dhaka-centered pattern of training and infrastructure investment layered onto a three-tier government/NGO/private special-education system, which creates a form of within-country inequality that is less prominent in studies from more administratively centralized systems. This suggests that policy solutions transplanted directly from other national contexts may need to be adapted specifically to address the government-NGO-private divide and the Dhaka-versus-elsewhere divide that this study's participants described, rather than treating ICT access as a uniform national issue.

It is also worth noting that the demographic variables summarized in Table 1 institution type (government, NGO, private), location, and disability focus were not used to systematically disaggregate the findings above. Quotations were anonymized by respondent number rather than tagged with institutional or demographic identifiers, which precluded a reliable comparison of, for example, whether NGO-run and government-run schools report different challenges. Given the qualitative design and the modest number of participants within each subgroup, any such comparison drawn post hoc from unmarked transcripts would risk overstating patterns that were not the focus of the original coding. We flag this as a specific direction for future research: studies designed from the outset to tag transcripts by institution type and location would allow this kind of disaggregated analysis, which this study's design does not support.

Finally, because participants were recruited through purposive-convenience sampling from a limited number of institutions, and because the term 'Special Schools' as used here refers specifically to the institutions sampled rather than special education provision in Bangladesh as a whole, the findings should not be generalized to all special-needs educators or all special schools in the country; they are best read as an in-depth account of the experiences of this particular group of 20 teachers.

5. Conclusion

This study identified several effective practices in the utilization of ICT tools in

instruction that reflects teachers' efforts and understanding of digital technology integration in classroom. The study also found several challenges that shows infrastructural, financial barriers as well as teachers' limited knowledge and skills to adopt ICT-based resources in teaching-learning activities. Therefore, the study recommends that the Ministry of Education and Directorate of Secondary and Higher Education establish a dedicated annual budget line for assistive technology and internet connectivity in government, NGO, and private special schools outside Dhaka specifically, since participants identified Dhaka-centered resource concentration, rather than lack of resources nationally, as the core problem. In this aspect, the study suggests that developers and adopting institutions prioritize Bangla-language interfaces and offline-capable, low-bandwidth versions of visual-schedule, reading-support, and speech-to-text applications, directly addressing the language barrier and unreliable internet access that participants described as concrete obstacles. Moreover, the study proposes replacing the current short, one-off training model (participants described trainings as brief as a six-month diploma with no follow-up) with mandatory, competency-based in-service training of at least several weeks, paired with ongoing coaching visits, and recommends embedding a dedicated assistive-technology module in pre-service special-education teacher certification. The study did not include other relevant stakeholders such as parents, administrative personnel and other relevant professionals; hence, the findings might not cover all of the perspectives. Therefore, the study emphasizes on broad ranged research incorporating all of the stakeholders in special education context. Nevertheless, this study will be impactful for the policy-makers as well as field-level special educators to understand effective practices of ICT tools integration. Furthermore, the identified challenges would be helpful in provoking the stakeholders to find sustainable solutions in offering meaningful and equitable learning experience with digital technology integration to the learners with diverse educational needs.

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