

Employing Assistive Technology (AT) for Children with Special Educational Needs: A Case Study from Pakistan

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In the era of the technological revolution, substantive research is required to assess the effectiveness of Assistive Technologies (AT) for the educational needs of children with special needs. Although studies have been conducted to examine the usefulness of integrating assistive technology into teaching content that caters to CWSN. However, it remained a less explored area in the context of developing countries, particularly in Pakistan. Also, there is a lack of awareness regarding the use of AT in the context of Pakistan. The paper addresses how assistive technology can be utilised to educate CWSNs effectively and transform their lives. It also explored the challenges related to its accessibility and availability. The case study design was adopted, and semi-structured interviews were conducted with the administrator, coordinators, and teachers. The interviews were transcribed and analysed by using thematic analysis. The findings of the research study indicated that the quality of life of CWSNs can be made not just easier, but AT can contribute to their overall well-being.

Keywords: Assistive Technology (AT), Case Study, Children with Special Educational Needs (CWSN), Educational Transformation, Inclusive Education, Sustainability, Thematic Analysis

1. INTRODUCTION

The educational world has transformed massively, which is a consequence of the revolution in technology. During the technological era, it is obligatory to make technology available and accessible for an effective teaching and learning process (Krasniqi, et al. 2022). The pandemic resulted in the closure of educational institutions which affected learning and development. This happened to both children with and without disabilities, however, children with disabilities suffered more as they had problems related to retention and memory. COVID-19 badly affected their academic and social activities (Najam, et al. 2022). Therefore, AT is a need of the day as it enables expanding the functioning of CWSNs and makes them independent. AT has a broad range of tools from simple wheelchairs to more intricate devices and educational software. The quality of education provided to children with special educational needs can be enhanced using assistive technology but can also contribute to the achievement of Sustainable Development Goals (SDGs) (Harper, et al. 2017). The Sustainable Development Goals aim to transform the world of education by providing quality and technologically sound education. Therefore, assistive technology can serve the purpose.

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The SDGs provide an opportunity to create awareness and to work to increase the accessibility to assistive technology (Karki, et al. 2021).

It is important to note here that the terminology assistive technology refers to a tool or a device, any equipment, or even a software program that can improve the functionality of persons with disabilities (PWD) or children with special educational needs (CWSN) or children with disabilities (CWD). It could also comprise tools that help them achieve their day-to-day tasks independently. It can include mobility devices, for example, walkers, and innovative software programs that can support diverse disabilities, such as learning disabilities and audio-visual impairment, to name a few (Ahmed, 2018). It is very important to understand that these intricate devices help improve the functionality of a CWSN but also make them independent, for instance, there is software available to magnify the screen and help those who are visually impaired (Qwuor, et al. 2018).

It is a need of the day to encourage equity and promote the inclusion of children with special educational needs in a mainstream setup by equipping them with resources (Hameed & Manzoor, 2019). Assistive technology can fulfill the dream of turning inclusion into a reality (Harper, et al. 2017). Assistive technology is transforming the lives of CWSNs by enhancing their functionality and reducing their dependence. For instance, the use of mechanical devices including hearing aids intricate software for instance magnifiers for facilitating visually impaired children, and other text-to-speech software are available. All these are transforming the lives of CWSNs and are contributing to their well-being (Kamran & Siddiqui, 2023).

The sustainable development goals demand an equitable, favourable, and inclusive learning environment that mandates the inclusion of all learners in mainstream schools (Genc, et al. 2021). Children with special educational needs are those having any physical, intellectual, behavioural, or emotional disability that requires inclusion by the school or any other organisation, workplace, or community (Fernandez-Batanero, et al. 2022). It comprises a range of disabilities, for instance, autism, and learning disabilities, to name a few that need to be included. This is a philosophy of inclusion in which all individuals are provided with equal opportunities and resources so that they are not left out (Krasniqi, et al. 2022). In this regard, the most important resource is to incorporate assistive technology which can facilitate the inclusion of children with special educational needs into the mainstream setup (Owuor, et al. 2018).

Safdar, et al. (2019) stated that in the context of Pakistan, there are barriers to the use of AT, and these are lack of awareness and knowledge of how to use it. Siddiqua (2022) stated that the unaffordable prices of these devices are also a barrier and funding is also not provided. It was found that its need was not considered important because of a lack of knowledge and training regarding using it. The walking devices were supported but when it comes to using software teachers are found reluctant (Manzoor, et al. 2022). This shows a lack of knowledge and training, but the leading cause is financial constraints (Safdar, et al. 2019). The current research study also explored that the rare use of AT is due to a lack of funding and training. The present study found that if funds are to be available then affordability, accessibility, and availability will be improved. Its use is extremely important for CWSN to carry out their daily activities effectively and independently.

It is enormously significant to comprehend that the terminology special needs or special educational needs are synonymous with disability. These two terminologies are used interchangeably in this paper. According to Fernandez-Batanero, et al. (2022), the conventional method of using the same obsolete devices to deliver teaching and learning is reducing the eminence of educational programs and they are falling far behind what the sustainable development goals demand today. Therefore, a modernised form of educational programs in alignment with the latest tools and devices for both children with and without disabilities is needed (Harper, et al. 2017). To give assurance that children with special educational needs are equipped to meet the pedagogical challenges of the modern world these tools are proven to be effective. These tools enable one to cope with challenges with fewer complications (Krasniqi, et al. 2022). In this regard, the right use of the right technology is required. Publicising and familiarising the right assistive technology for students with disabilities can play a vital role in saving time and effort (Malik, et al. 2020).

In the context of Pakistan, the needs of children with disabilities are not realised effectively. However, policies are made to accommodate CWSN, but implementation remains questionable (Hameed & Manzoor, 2019). The need for inclusive education is felt and the country is striving hard to turn inclusion into a reality, but the dilemma is that willingness is missing (Kazmi, et al. 2023). However, with the increase in global concern regarding the implementation of inclusive education private educational institutions have established schools to promote inclusion (Kamran & Thomas, 2021). The current case study is an example of an inclusive school where students with autism, cerebral palsy, down syndrome, learning disability, and developmental disorders to name a few are included and accommodated effectively. The present research study explored the school because it is an inclusive school working for more than 25 years to promote inclusive education in the country. It also addressed challenges related to the use of AT.

Pakistan is a signatory to many international documents that argue for inclusion and endorsed sustainable development goals that demand quality education. The indicators of quality education are the provision of resources that include technology incorporation (Kazimi & Kazmi, 2018). The research gap highlighted after an intensive literature review that the exploratory studies are not yet conducted in the context of Pakistan related to the incorporation of assistive technology for catering to children with special educational needs (Malik, et al. 2020). The current case study can significantly contribute to putting forward the effectiveness and challenges related to the incorporation of assistive devices.

The Study is Guided by the Following Research Questions:

- RQ 1. How assistive technology is effective for teaching children with special educational needs to promote inclusion in school?
- RQ 2. What are the challenges that inclusive schools face regarding integrating assistive technology?

2. LITERATURE REVIEW

Amartya Sen's Capability Approach and Nancy Fraser's Theory of Social Justice Concerning Inclusion.

The research study is guided by the theoretical lens of Amartya Sen's Capability Approach (1980) and Nancy's Fraser concept of Social Justice (2007; 2008a). The

selected theories are the most relevant for research as these have facilitated cognising the ontological position and also provided a philosophical foundation for establishing the research problem. Amartya Sen, a well-known economist and philosopher stated the idea of capability deprivation. It explains that having wealth is not just enough. An individual must have the capabilities to lead a fulfilling life. He believes that poverty is not about lacking income but also lacking access to services, such as education, health, and other necessary goods (Sen, 1980). Relating this concept to children having disabilities it is needed to develop capabilities in our education system by making use of the social justice approach. Therefore, we focus on the social justice theory, which integrates justice into parity of capabilities and respect for human diversity, since the capacity approach is seen as possibly providing a robust framework for social justice in education. This is mainly because, in addition to their shared commitment to equal opportunity, both theories would effectively frame the discussion regarding equity with an emphasis on human capital (capabilities) and human rights approaches (social justice).

Nancy Fraser, a renowned contemporary American political philosopher, put forward the theory of social justice (2007; 2008a) which is grounded on the idea of participating equally and linked to inclusive educational practices. It is proposed that the execution of social justice is primarily pertinent when supporting children with disabilities to provide them with a setting in which they can contribute as equals. Fraser (2007) indicated that it is established on equality of participation as its normative foundation and illustrated recognition, redistribution, and representation as to its dimensions. According to this norm, "Justice needs a social organisation that permits all members of society to interact with one another as peers" (Fraser, 2007, p. 36). The cognizance of participation equality encompasses the equal distribution of material resources, irrespective of differences in terms of gender, race, and other features (Amanda, 2012). Nancy Fraser's concept of justice as an analytical tool is a determination to support inclusive education and it is enriched through the interconnected ideas of recognition, redistribution, and representation (Amanda, 2012).

This study intends to theoretically establish that the capability approach by Sen emphasises the development of capabilities and Nancy Fraser's social justice theory focuses on the creation of a socially just environment. These two are the core of accomplishing equality for children with disabilities. The current case study explored the inclusive school where the use of AT enabled it to accommodate children with disabilities in a regular classroom. The use of AT facilitated children with disabilities effectively as they merged with their peers without disability. It was found that devices, for instance, hearing aids and other software including screen magnification software for children with vision impairment improved the functionality of children with disabilities and they interacted well academically and socially.

Relating to the rationale of the study, it is pivotal to understand the curricular modification as Malik, et al. (2020) discussed that the prevailing curricular and teaching-learning materials are not in alignment with the needs of children with special educational needs. Individualising the teaching methods and materials is one of the key requirements including alternative adaptations in alignment with classroom introductions. The concept of differentiated instruction includes the learning targets that need to be individualised following the needs of learners with special educational needs and

modifying learning targets employing simplifying academic goals aligning with standards of learning. In addition, supplementary targets including self-management and social skills need to be developed (Qureshi & Razzaq, 2019). In this regard, the use of AT helps to achieve learning targets by fulfilling the individualised needs of CWSN to be included effectively in a mainstream setup. By doing this, we have provided evidence for the significance of a socially equitable environment for the development of capacities and their applicability to children with disabilities.

Kyriazopoulou, et al. (2017) developed a collective understanding of what establishes quality inclusive preschool provision. This was the purpose of a qualitative 3-year (2015–17) study of inclusive settings for children from 3 years to compulsory education across European countries. The data consisted of practitioners' descriptions of 32 example-inclusive preschools from 28 European countries, namely Germany, Sweden, and France, to name a few, and more exhaustive data gathered during short visits to eight of the example settings. The qualitative thematic analysis identified 25 subthemes demonstrating the observed components of inclusive early childhood education provision. These were structured within a framework that entwined the structure-process-outcome model with the ecological systems model. The resulting adapted ecosystem model for inclusive early childhood education encompasses five dimensions: (1) the outcomes of inclusive education, (2) practices, (3) organisational factors within the microenvironment of the preschool, (4) inclusive structural factors at the community, and (5) at national levels. The framework can be beneficial for practitioners as well as researchers and policymakers pursuing the development of the provision of inclusive early childhood education.

In the context of Pakistan, a study was conducted by Qureshi & Razzaq (2019) on the attitudes of teachers toward children with disabilities. Through the focus group discussion, the findings suggested that inclusive education is an argumentative concern in Pakistan. Educator participants in the study were at the forefront of carrying out the transformation agenda, of converting mainstream schools into inclusive schools, and were apprehensive and uncertain. They were interested in the transformation but were not certain how to carry out successful inclusion. The confusion, regarding whether to include children with disabilities or not and hesitations generate an environment prevalent with ambiguities; on one hand, teachers were concerned by the acceptance of children with disabilities in education being a basic human right; then refuting inclusion to children with disabilities would be an immoral act.

Carrington, et al. (2019) presented the synthesis of seven research papers on inclusive education in seven developing countries of the Asia Indo-Pacific region namely Bangladesh, Sri Lanka, Bhutan, Kiribati, the Pacific Islands, Nepal, and Macao. The analysis of the literature review identified the following six key themes: (i) Flaws in developing and implementing policy guidelines on inclusive education; (ii) Ill-prepared educational institutes to cater to children with special educational needs; (iii) lack of institutional resources leading to deprivation and consequently hindering the admittance of children with special educational needs; (iv) lack of collaboration among the stakeholders hindering the way towards inclusive education; (v) lack of professionally developed teachers leading to reluctance towards including these learners; and (vi) Curriculum with lack of teaching and learning strategies that cater children with special educational needs.

There is a need for instant policy change because without this change carrying out the inclusion agenda forward might face serious hurdles (Carrington, et al. 2019). The

government of any country must include classroom teachers in all phases of inclusive policy development. It is recommended that the teachers be given opportunities for professional development so that they can play a role in fulfilling sustainable development goals and pave the way toward inclusive settings in schools. The teachers expect the school administrators to support and provide opportunities for professional development that will enhance their self-efficacy, reduce levels of stress, and improve their teaching effectiveness (Carrington, et al. 2019).

A study was conducted in the context of Pakistan where AT was incorporated, and these were the use of audio files for the hearing-impaired students. The students studied independently and fulfilled their academic needs effectively (Siddiqua, et al. 2022). Aftab, et al. (2022) stated that software related to word recognition and concept mapping helped students who struggle with written expression, for instance, students with dyslexia and autism spectrum disorder. With the use of software, the problem was resolved. Similarly, Kazmi, et al. (2023) discussed that electronic text and tape books resolved reading issues. However, the use of AT in Pakistan is limited (Kamran & Siddiqui, 2023). Children with certain special educational needs struggle to attain four basic language skills. They find it difficult to read, listen, or write and these skills are hampered. To decrease the difficulties of children with special needs software is available (Najam, et al. 2022). The software has developed Talk 'N' Learn-based English phonic software, Digital Talking Book (DTB), Fixture App, and Talking Book Application (TBA). 'Learning Tool for Autism Spectrum Disorder Students' (ASD) is also developed to provide a conducive learning environment for students with autism spectrum disorder so that they can learn with ease (Kyriazopoulou, et al. 2017).

3. METHODOLOGY

3.1. Design

Yin (2006) steered scholars to be aware of the target audience who can benefit from the research findings when planning a study. "A *case study design is a valuable opportunity to reveal a situation with an in-depth understanding of an event or individuals through direct observations and collecting data in a natural setting*" (Creswell, 2013, p. 73). This present case study occurs within the boundaries of a single location or a "bounded system" (Creswell, 2014). Yin (2006) also specified the justification for carrying out a single case-study design is that it should signify distinctive settings. In the current research paper, the single location is an inclusive school. It is a unique case where inclusive culture has been sustained for the past 25 years.

To achieve the objectives of the research study and to answer research questions, a purposive sampling technique is used. It is a type of sampling technique where the researcher selects a sample based on information about the population and the research study itself (Miles & Huberman, 1994). In a case study, purposive sampling mentions the assortment of respondents because of some specific criteria (Patton, 1999). For that reason, respondents were included by developing some selection criteria. The selection criteria are mentioned in Table 1 below for all the stakeholders including teachers, administrators, and coordinators. A total of 16 participants were interviewed, including the school administrator, three coordinators, and twelve teachers. Also, classroom observations were carried out.

Table 1
Sample Characteristics

S. No.	Pseudonym of Participants and Sex (m/f)	Designation	Experience	Job Responsibilities
1	Mahmud (m)	Director/Administrator	25 years	Founder/Administrative affairs
2	Zareen (f)	Coordinator	10 years	Communication, collaboration, and delegation of tasks, monitoring and supervision
3	Rabia(f)	Coordinator	12 years	Communication, collaboration, and delegation of tasks, monitoring and supervision
4	Rushna(f)	Coordinator	10 years	Communication, collaboration, and delegation of tasks, monitoring and supervision
5	Farina(f)	Teacher	6 years	English, Maths and Science
6	Ghazal(f)	Teacher	9 years	Social Studies and General knowledge
7	Amber(f)	Teacher	10 years	English
8	Kainat(f)	Teacher	6 years	Urdu and Islamiat
9	Aiman(f)	Teacher	6 years	Social Studies and General knowledge
10	Mina(f)	Teacher	8 years	English, Maths and Science
11	Beenish(f)	Teacher	6 years	English, Maths and Science
12	Yasra(f)	Teacher	10 years	Science
13	Isra(f)	Teacher	10 years	Maths
14	Rimal(f)	Teacher	6 years	Urdu and Islamiat
15	Talib(m)	P.E. Teacher	10 years	Taekwondo teacher/sports teacher
16	Rina(f)	Teacher	6 years	English, Maths and Science

3.2. Data Collection

The data collection method was observations of classroom activities and field notes, but the main research tool was one-on-one semi-structured interviews with all the stakeholders mentioned in Table 1. A total of 16 teachers were interviewed and their classes were observed. In qualitative research, semi-structured interviews are a frequently used data collection method (Johnson & Turner, 2003). It supported gaining understanding and bringing together exhaustive and in-depth information. It is stated by Patton (1999) and Miles & Huberman (1994) that during a research study observation can be enormously imperative and the most expedient way to record is in the form of field notes.

The main research tool was one-on-one interviews. The current research study used self-reported data collected through semi-structured interviews. It enabled to gain insight and collect in-depth information. The other data collecting sources were classroom observation and field notes. For gathering the data from classroom observation, the present research study used a standardised research tool, i.e., the

“Inclusive Practice Tool.” This tool is constructed by more than 40 educators in Massachusetts, USA for supporting inclusive practice in schools and facilitating educators to create a place for all students to flourish in general education settings. It is a tested tool to certify they were contributing to teaching and learning in inclusive classrooms. This tool in the form of a Guidebook was designed on the following guiding principles from (i) Universal Design for Learning, (ii) Positive Behavioural Interventions and Supports, and (iii) Social and Emotional Learning. In this Guidebook, a few other tools are also designed to support educator evaluation processes and assist educators in achieving higher levels of professional growth and satisfaction. In the current research study, the researcher used this guidebook to understand the pedagogical practices of teachers that create an inclusive learning environment in the classroom where children with and without disabilities learn together. For that purpose, “Inclusive Practice Tools.” was a useful tool for carrying out observations. Beyond formal interviews, classroom observations and field notes helped to gather rich data. The other reason for using multiple data collection methods is triangulation, which discusses the use of multiple data collection methods in qualitative research to develop a complete understanding of the phenomena being studied (Patton, 1999). Triangulation in qualitative research is a strategy to test validity through the convergence of data from multiple sources. The present research study triangulated all data collection methods to ensure validity.

3.3. Data Analysis

To develop an understanding of each transcript the reading and the rereading of text and field notes were carried out several times. The technique of open coding was applied for data analysis (Strauss & Corbin, 1998). To start to see patterns and clusters in the data set, undertook data coding manually using a highlighter pen. This process is termed ‘data reduction’, which is the first stage in the process of data analysis (Miles & Huberman, 1994). The subsequent stage was getting the data into categorised chunks, which is known as ‘data display’ (Miles & Huberman, 1994). According to Miles & Huberman (1994) ‘conclusion drawing/verification’ is the next stage in the analysis of data in which themes were analysed (Boyatzis, 1998). The same process was followed for data analysis. Reliability of findings was ensured using triangulation, prolonged engagement with data, peer debriefing, and member checking to ensure the social validity of the findings with participating stakeholders (Lincoln & Guba, 1985). Themes and subthemes were identified as the effectiveness and challenges of incorporating assistive technology to cater to children with special educational needs.

The themes derived from the collected data were arranged under the themes found in Figures I and II.

3.4. Procedure

The current research professed potential respondents as partners in an enterprise (Brooks, et al. 2014), based on a connection of mutual respect and trust. A vital element of this connection is informed consent. Informed consent was signed at the time of the interview, endorsing there is no harm or threat to members, and trying to establish trustworthiness and faith between the investigator and members. Above all, reassurance concerning the secrecy, privacy, and anonymity of members was given through a detailed

letter of information. It is exceedingly imperative to address that an ethical researcher keeps on inquiring about respondents' esteem, reducing harm and ethical behaviour in all phases of the research work, even the writing-up stage and afterward (Brooks, et al. 2014). All transcripts were securely stored. The respondents who signed the consent form were supported verbally that their identity would not be unveiled to anyone. For this purpose, pseudonyms are used.

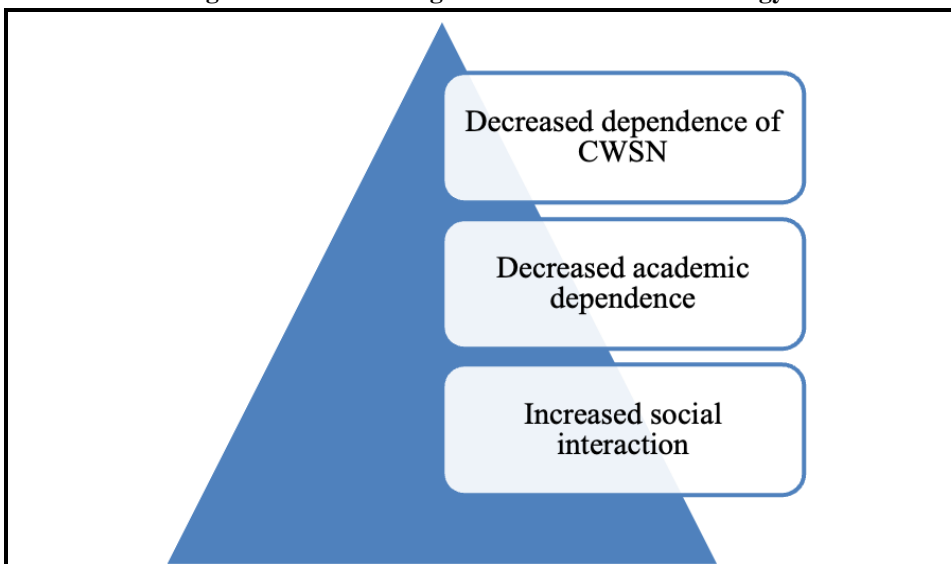
3.5. Research Findings

In the process of coding and data analysis of the transcripts, it can be stated that the two themes are of significance in answering the research question of the study and these are the effectiveness and challenges of incorporating assistive technology for catering to children with special educational needs:

3.6. Effectiveness of Incorporating Assistive Technology

The extensive literature review specified numerous benefits of integrating assistive technology into education to cater to children with disabilities and these are consistent with the research findings (see Figure I).

Fig. I. Benefits of Integration of Assistive Technology



One of the respondents stated:

The use of technology must be integrated into the curriculum meaning that there must be activities that illustrate the incorporation of technology to facilitate the teaching-learning process. We incorporate it for instance, for visually impaired students we use software effectively that enlarges the font size. This enables them to work independently as they can read effectively because of the larger font size (Amber).

The same idea resonates with the research findings during a classroom observation, a teacher downloaded the textbook in a larger font which aided CWSNs in reading and they showed amazing academic performance. A child was extremely excited to have that downloaded text.

During classroom observation, a visually impaired child was excited to have that downloaded text and he told his teacher about it which was noted during classroom observation. The teacher shared the incident during an interview. A teacher of grade V said:

One of my students was dependent previously and was not able to complete the reading task. He had excessive difficulty achieving it. He needed my help while reading. Now he can do it easily. He was not bad at reading; however, he could not see. As soon as I downloaded the textbook in a larger font, he was able to read it (Ghazal).

The use of assistive technology in the classroom is one of the most substantial modifications that educational institutes must make available and accessible; furthermore, teachers should be aware of the needs of students. Additionally, the finding is consistent with Harper et al. (2017) that high-tech computers and software can be helpful tools for children with disabilities such as a disability in solving mathematical problems, and disabilities in reading, listening, and writing. A teacher of science stated:

In the teaching-learning process, educators are in authority to provide assistive devices for children with disabilities to empower them to be effective in the teaching-learning process. Assistive technology can support educators in achieving their objectives by giving their children an opportunity for a bright future, for instance, a very important modified resource is designed for a child with autism who cannot balance himself and might fall off his chair. These chairs are assistive technology devices that could be used for facilitating CWSNs and can protect him from falling (Farina).

It was observed during classroom observation that assistive technology also has many therapeutic benefits, for example improving the movement of children with disabilities and their ability to complete daily responsibilities using wickers and walkers. Mobility aids are a source of increasing the self-confidence of children with disabilities and developing feelings of being secure, which supports them to reach the highest level of independence in their lives. Pupils with learning disabilities need assistive technology to permit them to participate and interact with their peers during cooperative learning activities in the classroom. The same idea is consistent with the research findings. It was observed during classroom observation that a child with hearing impairment was wearing a hearing aid and his communication and interaction were both enhanced. He responded to his peers and participated in classroom discussions.

A variety of assistive technologies has the potential to support children with special educational needs to develop skills related to their developmental areas. Related to this a teacher of English stated:

Assistive devices resolve problems linked to performance, concentration span, and the problems related to communicational skills, encountered by learners having special needs. The use of AT supports children with disabilities academically and helps to develop skills among students with disabilities (Amber).

As stated by the IDEA (2004) guiding principles for students with disabilities concerning the accessibility and availability of assistive devices to cater to their instructional or practical needs are present. There are numerous cases of setting up hands-on learning opportunities for students with special needs that might facilitate a student's interactional development. In the same way, these technologies can be used to facilitate a student's reach to educational institutions and can be used to support students with special needs both academically and emotionally. The same idea is discussed by a grade II Science teacher. She stated that:

Students with a learning disability can use assistive technology to improve their reading skills through computer-based software, available online, participate with their peers, and excel in reading. Furthermore, assistive devices could make the process of gaining information simple and subsequently increase the concentration span and interest in reading (Farina).

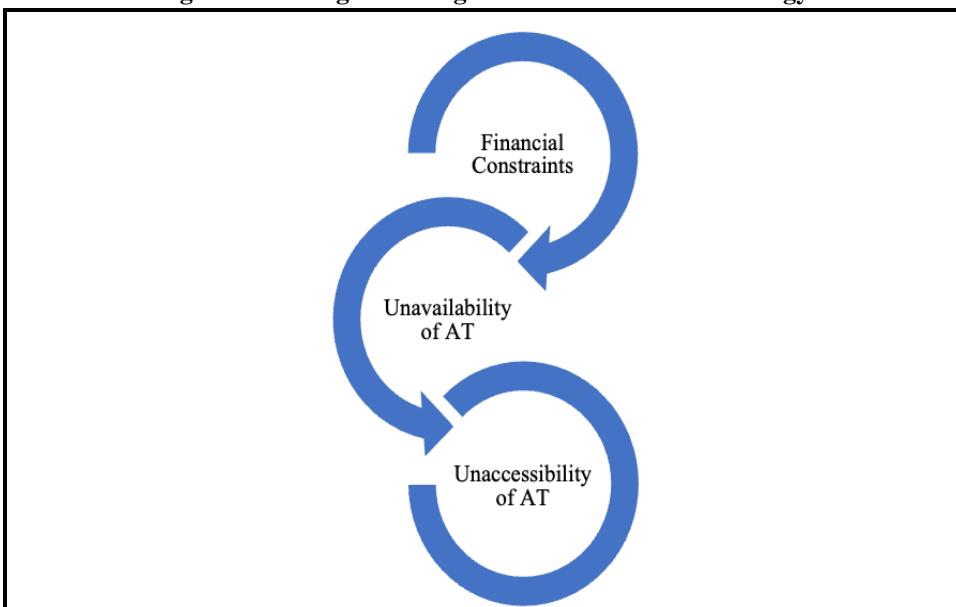
The current research study explored that assistive devices had all-embracing impacts on children with special educational needs due to their inclusion of them in society. Sharma & Wasson (2018) discussed the findings of their study that assistive devices are relevant for learners with mixed disabilities as a source of empowerment and gaining control over their educational settings. The findings of the study indicate that the empowerment of working autonomously was among the most mentioned advantages by stakeholders. Additionally, the respondents stated how this technology facilitated enhancing communication skills among peers, improved their determination to work together with their peers, and improved their self-confidence. A school coordinator stated:

There was a learning-disabled child, who was knowledgeable. He was unable to write as his fine motor skills were hampered. I composed a text, demonstrating how to create texts using multiple modes (e.g., print, images, and audio - for ICT texts) by using computer software. The text used to be in bold letters. I also supported him by helping with learning software. I used to type key points or words on the computer as her writing skills were hampered. Before the presentation, I wrote new vocabulary words and key points on the computer. I engaged her in computer-based activities. The child showed great improvement. The point which I emphasize instead of focusing on their weaknesses focus on their strengths. If they cannot write, engage them in computer-based activities and teach them by using alternative teaching methodologies (Zareen).

It is evident from the above interview excerpt that assistive devices can play a pivotal role in transforming the lives of children with special educational needs.

3.7. Challenges Related to Incorporating Assistive Technology

Despite this, some children with disabilities are still unable to access assistive technology devices due to monetary constraints. The finding is that it is a predicament that many students with disabilities are unable to use assistive technology and materials at school. A variety of assistive technologies and digital technologies can be used to provide support to children with disabilities in the classroom. However, the findings of this research study indicate that the unavailability of assistive devices poses challenges for both users and implementers (see Figure II).

Fig. II. Challenges of Integration of Assistive Technology

For AT to be implemented effectively, it is necessary to make it available. The director/ administrator stated:

Several worldwide agendas such as the Convention on the Rights of Persons with Disabilities (CRPD) and SDGs support governments in improving access to these technologies, even though improvement is often hindered by a low level of capacity of the country, and insufficient financial space and fiscal obligation to integrate assistive technologies into service provision (Mahmud).

The challenge highlighted was related to financial constraints as AT can be made available and accessible if financial barriers are removed.

The Director highlighted a very important aspect of the reasons for the unavailability which he believes is the biggest challenge:

The Convention on the Rights of Persons with Disabilities (CRPD) has made it mandatory to ensure the accessibility to assistive products that are not just of good quality but affordable as well. Despite these obligations, unfortunately, only 10 percent of the population has access to them. The demand for assistive devices is on the rise in low- and middle-income countries. The initiative taken by the World Health Organisation to meet the demand and to support countries in their struggle to fulfill the obligation of the Conventions on the Rights of Persons with Disabilities is launching the Global Cooperation on Assistive Technology (GATE). The initiative was taken in 2014 in collaboration with organisations for persons with disabilities. It includes agencies, for instance, UN and donor agencies, professional organisations, academia, and industry (Mahmud).

It is clear from the above statement that to make technology available there is a need for financial support in the form of funding to low-income countries.

Some challenges need to be focused on, for instance, every device is not suitable for everyone. This needs expertise as well to use the right technology for the right disability. As the coordinator stated:

It is equally important to explore which tool is appropriate for which type of disability. Research needs to be conducted regarding selecting the right technology for the right child. Also, every device cannot work for all children with special educational needs. In addition, a device that is effective for one person may not be effective for another. There is still a need to explore and expand assistive technology design, assessment, manufacture, and use, particularly in areas that are not well communicated, such as intellectual and visual disabilities. Investigation of assistive technology to help work and educate children with special educational needs is essential from a human rights perspective as well as to decrease poverty and meet sustainable development goals. To expand the use of assistive technology that is justifiably accessible, available, and reasonable, more research is needed (Rabia).

The above statement highlights a very important aspect of incorporating the appropriate technology as every device or aid is not suitable for all children with special educational needs.

This is a very thought-provoking statement by the Director regarding combating the challenges of AT. He stated:

Increasing awareness and understanding of the specialists in the field of assistive technology will lead to an increase in educational opportunities for children with special educational needs. Children with educational needs will be able to access available and suitable assistive technologies and be included in social life and education with the development of suitable assessment tools (Mahmud).

It is evident that the effective use of AT can be materialised with the knowledge of devices. For which professional help is needed by experts who can help in selecting the right tool for the child.

4. CONCLUSION

This research study aimed at optimising the teaching and learning process of children with special educational needs in the context of an inclusive school. Educational institutions are encouraged to facilitate Children with Special Educational Needs (CWSN) by using AT as a tool. For all-encompassing sustainable development, there is a prerequisite to prioritise the availability of assistive technology by development partners, organisations, and governments as a vital component (Ahmed, 2018). Providing worldwide access to high-quality assistive devices will not only develop the humanistic approach but will also ensure the well-being of society and make it economically, socially, and environmentally viable (Alkahtani, 2013). With the increase of children with special educational needs, the demand for assistive devices also increases internationally. Increasing demand puts pressure on the member states to address ignored areas of incorporating AT (Borgestig, et al. 2017).

The results also indicated that the right use of the right technology is required as it can be a source of achieving academic success. Familiarising and introducing the right assistive technology for CWSN can play a pivotal role in saving time and effort. The research findings indicated the effectiveness of incorporating AT in the teaching content

as it can play a pivotal role in decreasing dependence on CWSN and increasing their social interaction. The findings resonate with the literature that these useful devices help in enhancing the functional aspect of a CWSN but also make them independent, thus saving time (Qwuor, et al. 2018). There is a need for widespread access to assistive devices that are of high quality and reasonably priced, to fulfil the agenda of no one being left behind and accomplishing sustainable development goals (Erdem, 2017).

The research findings highlighted the challenge of accessibility and availability of assistive technology. It can play a fundamental role in the field of catering to children with special educational needs because many pupils with disabilities require explicit instructional treatment. A variety of assistive technology devices and tools exist that, with cautious preparation and organisation, can support students with special educational needs (Genc, et al. 2021).

The research findings illustrated some useful assistive devices, for instance, screen magnifiers, audio files, and other computer-based software. Classrooms with special education needs are set up so that teachers catering to children with special needs have increased responsibilities. The use of technology can promote the inclusion of children with disabilities in a mainstream classroom setup, thus transforming their lives. Through technology, one can transform education for children with disabilities so that they can play an active role in society as valuable human resources (Hameed & Manzoor, 2019).

It is therefore mandatory to put emphasise that the application of assistive technology reassures a sense of accomplishment and collaborative input in the classroom set up for children with special educational needs. Assistive technology improves and contributes to boosted motivation and assistive technology can act as a provision for the education of children with special educational needs, in that way reducing the pressure of work and stress levels of teachers (Karsniqi, et al. 2022). The research findings also illustrated that visually impaired children were motivated when they used devices like magnifiers, and they could read easily. Assistive technology can be a powerful tool in attaining quality education and inclusiveness for students with disabilities. Thus, this determination supports several of the important purposes of connecting children with disabilities to classroom activities enjoyed by their evolving peers, resulting in a sense of accomplishment, collective actions with distinct outcomes, and unbiased didactic knowledge (Ok, 2018). This resonates with the research findings that peer-to-peer interaction improved and resulted in increased social interaction.

Assistive technology brings about variations and modifications for children with disabilities. Variations that have been extensively used to recompense for obstacles related to difficulties in reading, writing, mathematical reasoning, and problem-solving skills. Furthermore, assistive technology can support children with disabilities to compensate for challenges in learning, particularly in the area of written work, by providing computer-supported tools (Qureshi & Razzaq, 2019). Additionally, this knowledge and use of assistive technology can also reduce frustration, increase enthusiasm, foster a feeling of peer acceptance, and enhance efficiency in school and at home. The findings are consistent with the literature as the use of AT not just improved their social interaction but also their academic performance. Therefore, the idea of implementing assistive technology for special needs children in school should be emphasised by teachers and school heads (Harper, et al. 2017). Teachers are expected to

choose the competence of existing assistive technology and manage children to ensure that the required alterations are made to reflect the changing abilities of the children.

The potential of assistive technology for children has been understood; however, implementation is challenging, especially for developed and underdeveloped countries (Ahmed, 2018). For every child with special educational needs, this assistive technology could be one way to eradicate difficulty in teaching and learning. However, there are challenges related to assistive technology and these are as indicated by the findings of the current research study. It was explored that there are issues that children with disabilities are still unable to access assistive technology devices due to monetary constraints and this finding is consistent with the literature. The literature also highlighted the challenges of accessibility as these devices are not affordable particularly, in developing countries including Pakistan (Safdar, et al. 2019).

Another intriguing finding was that there is a need to use the right technology for the right child. The current research study explored that every device is not appropriate for each disability type. Therefore, careful selection of AT is a need of the day. Connecting with this professionally developed teacher can impart the right use of technology for the right child and this finding is consistent with the literature. The literature states that a professionally developed teacher can be a source of selecting and using the right technology according to the individual needs of CWSN (Erdem, 2017).

It is recommended that governments, and other stakeholders embrace a systematic approach to confronting challenges at each level and work in collaboration to cope with challenges related to managing assistive technology and these require immediate attention. Primarily there is a need for establishing and maintaining professional networks and engaging in a community of practices to rightly utilise AT devices in inclusive classrooms. Another aspect that needs to be focused on is identifying and recognising knowledge and expertise in the field. Furthermore, funding is essential to ensure its availability and accessibility. The outcomes of the research study can significantly contribute by creating awareness among schools that are concerned with promoting inclusion. It can also be a source of achieving sustainable development goals by facilitating inclusion. The incorporation of assistive technology can be a source of transforming educational scenarios to transforming lives. Fernandez-Batanero, et al. 2022; Genc, et al. 2021 suggested that the attainment of sustainable development goals can be ensured by a collaborative approach to including children with disabilities in research and development, infrastructure, sustainability, policy, and planning.

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