A Review on Technology in Education for Differently Abled Students

Chethana H.T[1]., Manjesh R[2], Trisiladevi C Nagavi[3],
Aditya C.R.[4]

[1]Department of Computer Science and Engineering, Vidyavardhaka College of Engineering, Mysuru
[2]Department of Information Science and Engineering, Vidyavardhaka College of Engineering, Mysuru
[3]Department of Computer Science and Engineering, S J College of Engineering Science & Technology University, Mysuru
[4]Department of Artificial Intelligence and Machine Learning, Vidyavardhaka College of Engineering, Mysuru

ABSTRACT

Technology involves utilizing scientific understanding, tools, and methods to develop systems, products, or processes that address problems and enhance human abilities. Technology's role in education includes enriching learning experiences using digital tools and resources, making information more accessible, and enhancing communication and collaboration among students and teachers. Technology in education significantly enhances accessibility and inclusivity for differently abled students. Tools like screen readers, speech-to-text software, adaptable keyboards, and customized learning applications can be utilized to overcome a variety of physical, sensory, and cognitive problems. By making it possible for students with disabilities to engage with educational materials, communicate more effectively, and participate actively in class activities, these assistive technologies promote personalized learning and guarantee equal learning opportunities for all. In this research paper, a review on technology in education for differently abled students is discussed. Assistive technology for children, different devices which can be used for differently abled students, categories and their services are also discussed in this research paper.

Keywords: Assistive Technology, Cognitive Disability, Differently Abled Students, Education, Technology

I. INTRODUCTION

Technology has significantly impacted education, revolutionized teaching and learning processes [1]. It has made education more enjoyable and efficient, allowing for automation of tasks and improved knowledge dissemination [1]. Educational technology serves as a medium to enhance learning performance and increase student engagement through interactive tools and multimedia resources [2]. Various technology-based approaches have been studied, including computer-assisted learning, online courses, and digital personalized learning platforms [3]. Although there are many benefits to integrating technology into the classroom, it is important to see it as a tool to accomplish learning objectives rather than a goal in itself [4]. When the technology is integrated well, students may select the right resources for gathering, evaluating, and presenting information in a professional manner. However, further research is needed to fully understand the impact of technology on learning outcomes and to improve its integration in educational settings [3].

Types of Educational Technology

Instructional technology encompasses a wide range of tools and strategies for facilitating learning experiences in numerous different environments. They fall into four main groups:

expression, construction, communication, and inquiry. Technologies based on computers and mobile devices are some of the latest advancements in instructional technology, which have facilitated greater accessibility and comprehensibility of e-learning. Instructional technologies in medicine have increasingly been employed to foster novel pedagogical methods [20]. These technologies range from early instructional aides to more sophisticated uses including flipped classrooms, mobile devices, virtual and augmented reality, simulations, and collaborative learning [17]. More than 40 medical disciplines have used educational technology in medical education, and the majority of research have shown good evidence of their effects [20].

Advantages of Educational Technology for Institutions, Teachers and Students

With its many benefits for educational institutions, instructors, and students, educational technology has drastically changed the way that teaching and learning are conducted. It enhances student engagement, motivation, and learning [21] [22]. Distance learning and course delivery have been enhanced by the use of ICT resources including laptops, smartphones, and electronic whiteboards [22] [23]. Although appropriate training is necessary for its best usage, educational technology offers teachers new ways to efficiently convey knowledge [21] [12]. Institutions benefit from the digitization of classrooms and the ability to offer distance education [22] [23]. However, it's crucial to ensure that technology complements rather than replaces traditional teaching methods [22]. Overall, the adoption of educational technology has revolutionized the education sector, thereby creating more opportunities and improving the overall learning experience for all stakeholders involved in it [12] [23].

Educational technologies have become increasingly prevalent in modern learning environments, offering diverse tools to enhance the educational experience. These technologies include adaptive systems, cloud computing, and big data analytics, which enable personalized learning experiences and efficient resource management [13]. E-learning platforms have emerged as significant competitors to traditional education, utilizing 3D technologies, interactive tools, and mobile-based applications to facilitate knowledge transfer [13] [19]. In medical education, various technologies have been employed across more than 40 domains, with positive evidence supporting their benefits [20]. The integration of these technologies has led to substantial changes in educational environments, allowing for real-time monitoring of student performance, customization of learning strategies, and improved accessibility to educational resources [13]. As a result, educational institutions are increasingly adopting these technologies to modernize their teaching methods and enhance overall learning outcomes.

II. CHILDREN WITH DISABILITIES

The inability of a person with a disability to engage with an environment that does not support them is known as disability. When paired with other barriers, the physical, mental, intellectual, or sensory impairments that the majority of children in this age group have can prevent them from being fully and equally included in society [23]. Different types of disabilities found in children are discussed below.

1. Visual impairment: In this type of disability, an individual is due to poor vision, it is impossible to move independently.
2. Hearing impairment: In this kind of condition, the individual is either totally or partially deaf.
3. Language and Speech Disability: This category includes individuals with disabilities who have trouble expressing, receiving, and decoding language sounds.
4. Physical/Locomotor Disability: This type of disability prevents a person from walking, bathing, urinating, and doing other daily tasks.

5. Cognitive Disability: The phrase "cognitive disability" refers to a broad category of intellectual and cognitive impairments, including developmental disabilities, mental retardation, delayed development, and illnesses that cause cognitive impairment, such as neurodegenerative diseases or acquired brain injuries.

6. Children with learning disabilities: In this type of impairment, an individual faces several difficulties: problems in identifying themselves, decrypting and encrypting letters and syllables in words, problems in identifying numbers, and issues with calculation.

IV. ASSISTIVE TECHNOLOGY FOR CHILDREN

Assistive technology has emerged as a critical component in addressing the unique needs of students with disabilities, empowering them to overcome barriers and reach their full academic potential [22]. Over the last several years, the number of learning disability students has increased exponentially, and federal laws mandating "academic adjustments" for disabled students have prompted the creation of postsecondary learning disability support service programs to meet these growing demands [14] [15]. Within these support service programs, assistive technology has become a central focus, providing a range of tools and solutions that enable students with disabilities to access educational materials, participate actively in classroom activities, and demonstrate their knowledge and skills with greater ease and independence.

The key advantage of assistive technology is its ability to address the core challenges faced by students with learning disabilities [16]. Students with reading difficulties can benefit from text-to-speech software and digital reading tools, while speech recognition and word prediction programs can assist those with difficulties expressing themselves in writing [14] [16].

In addition to helping students with disabilities succeed academically, assistive technology can be extremely helpful in fostering the development of self-management and organizational skills, which are frequently necessary for success in postsecondary education [16].

A) Assistive Inclusive Technology for Learning

In the field of assistive technology, there are numerous myths. Students with disabilities are the only ones to use assistive technology. The misconception is that children with special needs are the only ones who can use assistive technology. The second myth is that assistive technology is too costly for low-resource nations to buy, despite the fact that it can help children from preschool through higher education. The third myth, assistive technology is an application of basic engineering for learning [12]. For example, most of the assistive technologies shown in Figure1 are not advanced. The use of assistive technologies for all age groups in shown in Figure 2.

Figure 1: Assistive Technologies [17]

Figure 2: Use of Assistive Technologies for all Age Groups [18]

B) **Assistive Technology Devices**

Assistive technology can improve participation and independence for children with special needs when it is appropriate to the user and the user's environment. It allows them to become independent and to have a voice in learning activity with peers. Students with special needs face a wide range of challenges when it comes to succeeding in an inclusive classroom. Selecting an appropriate assistive technology device plays a significant role in supporting their learning [20].

Assistive technology devices come in various categories such as visual impairment, physical disabilities and hearing impairment.

• Visual Impairment: Some of the assistive technology devices such as Braille products, low vision products, DAISY players, optical character reader and Braille printer comes under the category of visual impairment.

➢ Braille Products: Braille Sense U2 and Smart Beetle o Braille Sense U2: The blind can utilize the Braille tablet for a variety of tasks, from word processing, reading e books, web browsing, social networking, voice notes, and emailing as shown in Figure 3.

Figure 3: Braille Sense U2 [19]

Smart Beetle: This palm-sized Braille display provides Braille input and output to all mobile devices, including computers, phones and tablets, thanks to a USB port as well as up to five Bluetooth devices. It allows simultaneous connection to one USB and up to 5 Bluetooth devices as shown in Figure 4.

Figure 4: Smart Beetle [19]

➢ Low Vision Products: E-bot Pro, GoVision and Lifestyle HD 22

E-bot Pro: An adaptable, portable electronic   magnifier with text-to-speech and
   optical character recognition (OCR) to reduce eye strain that connects to a range of
   screens as shown in Figure 5.

Figure 5: E-bot Pro [19]

GoVision: It is a dedicated USB drive offers unprecedented direct viewing access to videos,
images, and documents as shown in Figure 6.

Figure 6: GoVision [19]

➢ DAISY Players: Blaze ET, 3Star, ReadEasy Move, Juliet Pro60 Braille printer

Blaze ET: Providing access to electronic documents and media for the visually impaired
people as shown in Figure 7.

Figure 7: Blaze ET [19]

ReadEasy Move: It helps in Improving the access to printed material for the blind and print disabled by analysing printed text and reading it aloud as shown in Figure 8.

Figure 8: ReadEasy Move [19]

Juliet Pro60 Braille Printer: It is a durable and light weight Braille embosser for the blind and visually impaired as shown in Figure 9.

Figure 9: Juliet Pro60 Braille Printer [19]

2. Physical Disabilities: Special keyboard and special mouse are some of the assistive technology devices under the category of physical disabilities.

Special Keyboard: For those who are blind or visually challenged, the Bluetooth keyboard makes using their iPhones and iPads faster and more precise.

Figure 10: Special Keyboard [19]

Special Mouse: An enlarged track ball designed for people with poor dexterity who find it difficult to use a conventional mouse as shown in Figure 11.

Figure 11: Special Mouse [19]

3.Hearing Impairment: Image phone and digital assistive aids are some of the assistive technology devices under the category of hearing impairment [21].

Image Phone: It is a wireless and wired video phone with a widescreen for people who are hard of hearing or deaf to help with sign language communication as shown in Figure 12.

Figure 12: Image Phone [19]

C) **Assistive Technology Services**

These are the services that help a child with a handicap choose, buy, or use assistive technology gadgets in a direct manner. They are mentioned in the list below.
• The assessment of the student's technological demands, which includes a functional assessment in the person's usual setting.
• Acquiring assistive technology gadgets for students with impairments by purchase, leasing, or other means. • Choosing, creating, fitting, modifying, applying, and caring for assistive technology equipment.
• Syncing assistive technology devices with services.

IV.**CONCLUSION**

Through the provision of accessible resources, adaptable tools, and individualized learning experiences, technology has closed gaps and created new chances for these students to learn and achieve. From tailored learning platforms that meet a range of needs to assistive equipment like screen readers and speech-to-text software, technology enables students with disabilities to interact with education on their own terms. As a result, they can participate as much as they can with their peers in the educational environment, which helps them become more integrated. Technology will continue to play a major role in helping students with disabilities so that every student may perform to the best of their abilities.

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