

Barrier Assistive Technology in Inclusive Classroom

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Abstract—Assistive technology can offer students with disabilities essential tools for achieving more independence, social inclusion, and engagement in society. Due to hurdles to obtaining and using assistive technology, this promise is not always fulfilled. This research attempts to identify impediments to acquiring and using assistive technology for students with impairments through literature analysis. Five scientific databases (SCOPUS, Science Direct, Google Scholar, and ERIC) were systematically searched to locate relevant qualitative research articles. Twenty-eight met the inclusion criteria and were included in the analysis of Analytical themes in the literature study. Research questions as themes in the literature study include identifying students with special needs, the relationship between inclusive education and assistive technology, and barriers to designing and implementing assistive technology. Barriers are interconnected and shared across different student disabilities. The involvement of users and school components to decision-makers involvement is significant for developing strategies, adapting technology, and providing assistive technology that can overcome service provision and design barriers for assistive technology. Easily accessible information will provide greater awareness to overcome information, psychological and social barriers to assistive technology.

Keywords—assistive technology, disabilities, implementation, barriers

I. INTRODUCTION

The last decade's technological progress brought globalization of the economy, global expansion of technology, social relations, culture, and education changes. Media and information technologies are rapidly developing and offer enormous potential for improving human well-being. In particular, it is vital for children with special educational needs, who would otherwise be unable to obtain an appropriate level of education without the aid of modern technology. Information and communication technologies make it easier for these citizens to participate in society [1]. In

all societies of the world, some people have special needs. Learners with special needs require exceptional responses. They should be encouraged to take part in their education. In the conventional classroom, these children cannot learn effectively. In order to reach their full potential, they require special education and related services potential. Creating an environment in which children who are able and willing to learn can do so is crucial to the school's success. Together, disabled people can learn. Such an environment must be child-friendly and welcoming, as well as healthy and safe.

The creation of such child-friendly learning environments is an inclusive classroom. It creates a loving and accepting environment in the classroom for the child with special needs [2]. Learning could be made easier and more accessible for children with special needs whose learning differs from regular learners [3]. Believe that it comes to children with disabilities, educational or instructional technology cannot be relied upon to provide a complete educational experience. To be effective for students with special needs, teachers must integrate technology into the learning environment. What is the impact of this on student learning? Teaching requires a thorough understanding of history. Teaching children with special needs requires the proper application of these devices. Individual learners' capacities are varied, Finding solutions to reduce barriers to learning and ensuring equitable access to education becomes essential. It has the potential to support lifelong learning for all students, including those with special needs.

II. METHOD

The current research is a synthesis of previous findings. The studies published in the last decade were gathered in SCOPUS, Science direct, Google scholar and ERIC. These key word include "barrier" "technology", "technology training for teachers", "assistive technologies", as well as "technology in

education", "technology in special education", and "educational technology" as keywords. The use of assistive technology (AT) to aid with daily tasks, social or educational activities was. Several articles and surveys had been done on this topic. Others interview caregivers, educators, and professionals to learn how AT assists students with disabilities regarding physical accessibility, social connection, and what training they received for using these educational technology devices. The search found thirty articles that appeared to meet the criteria, but seven of the screened articles did not address the specific effects of technology use in the classroom. Finally, Twenty-eight articles were selected. Most research focuses on what types of assistive technology tools are used, whether AT helps students with disabilities to develop independent skills or improve their social interactions. Selected articles were reviewed and analyzed, ensuring there were no inconsistencies between studies.

TABLE I. QUESTION RESEARCH

Item	Question research
Q1	Who is called a student with special needs?
Q2	what is the relationship between inclusive education and assistive technology
Q3	What are the barriers to designing and implementing assistive technologies?

The review of the articles is done with the PICO technique. According to (Cooke, Smith, & Booth, 2012), analysis by PICO method refers to the acronym: P represents the subject, population, and problem, I is an intervention made by researchers, C is a comparison, and O is the outcome or result of the study. As a starting point, PICO defined study problems and chose three separate scopes. The three scopes, namely: identifying students with special needs, the relationship between inclusive education and assistive technology, and barriers to designing and implementing assistive technology.

Inclusion criteria for selecting appropriate journals to address research questions; (1) Articles using English searched through an electronic database; (2) Articles that rely on AT as the target approach; (3) Scientifically credible articles. Exclusion criteria for the study of this literature, namely, (1)Articles not written in English; (2) Articles listed in other databases. Each article is given a rating based on its quality. Articles are assessed using a formula to determine their credibility and validity. The following is the checklist that was used:

1. Is the research's objective stated clearly?
2. Is this research cited by other authors?
3. Is the information in the article reliable and backed up with evidence?

Search results through an electronic database of selected articles will be stored and extracted to obtain information, among others; (1) Authors and years of

research Source of publication; (2) The method for learning about the implementation of AT.

Each database and reference is stored in a bibliographic file. Then read all the titles and abstracts and check the inclusion criteria and exclusion criteria to assess the quality of each article. Furthermore, it will be done to classify the article according to the type of research conducted. Then the article data stored in the bibliography is reassessed to ensure the criteria for inclusion, exclusion, and quality of the article

III. RESULT AND DISCUSSION

A. Student with Special Needs

Children with special needs There are various children with special needs, including blind, deaf and hard of hearing, or trouble speaking. There are also children with learning disabilities and intellectual disabilities, as well as gifted students [4]. There are people with learning disabilities, mental retardation, emotional disturbances, auditory impairment, speech impairment, and visual impairment in every community and school system. The role of assistive technology (AT) in educating children with disabilities Technology-assisted devices could teach special needs individuals whose learning needs differ from regular learners. AT would make education easy and accessible for them [2]. According to [5] the education system is under Standards are being raised under growing demand, develop social and personal abilities, and expand curricula to provide equal educational opportunities. So education will focus on future educational efforts to improve their standard of living; as they play an essential role in national development, their schooling must be given adequate attention and funding.

B. Inclusive Classroom and Assistive Technology

Students with disabilities sometimes have minor interactions with friends their age. Technology can help students spend more time connecting with their classmates, both in terms of quality and quantity [6]. In inclusive education, communication is essential to create mutual tolerance and respect. Students with and without disabilities are educated in the same classroom in an inclusive setting [7]. [8] explain inclusive setting provision of services in general education courses to students with disabilities, including those with severe impairments, as well as the required support services and additional help to assure academic, behavioral, and social achievement.

Assistive technology is needed to support the education of children with special needs to increase access to the educational curriculum dan social interaction [1]. An *assistive technology device*, as defined as any item, piece of equipment, or gadget used to help people with disabilities. Acquisition, modification, or customization of a product purchased commercially, modified, or customized to enhance the

product's performance to enhance the functional capabilities of individuals with disabilities [9]. People with special needs can benefit from assistive technology [10]. When it comes to hearing aids and ear molding machines for children with hearing impairment and language skills acquisition libraries for adults, these are just a few of the needed items. Some of the tools that would be more effective for children with learning disabilities would include electronic games, batteries for test kits and atomic absorption electro- photometers; bottle caps; word cards; cardboard papers; computers, nerf balls; and color paints; among others. Access to education is different for those with visual impairments. For example, there is a Braille machine and thermoform machine [11].

Depending on the level of sophistication, assistive technology devices can be classified as low technology, medium technology, or high technology [6]. Electronic equipment is not always used in low-tech products. Communication boards in the shape of bowls with lips, sticky notes and pen grips, and word cars are examples of simple to manufacture or obtain items. Audiobooks, single-use voice output devices, tape recorders, talking calculators, visual timers, and wheelchairs, on the other hand, are examples of medium technology devices. Easy to use and does not require intensive courses is the hallmark of the middle assistive technology [6]. On the other hand, high-tech device are complicated equipment typically employed to accommodate a specific disability. Voice output, prosthetic limbs, automatic page-turners, and virtual reality systems are examples of such technologies. They may be beneficial in an inclusive school for children with special needs [12].

Several educational doors have been opened by assistive technology, particularly for students with disabilities. It may be a tremendous equalizer for those who cannot fully participate in school and the community. "A voice" may now be provided for an individual who is unable to talk. Students can ask and answer questions in the inclusive classroom, overcoming a hurdle that may have led them to be placed in an exclusive classroom or require a full-time translator [13]. Technology helps student with special needs to participate in the mainstream of classroom, prepares them for work and social contact, increases their self-confidence, enabling them to make choices and exercise control over their ideas. When it comes to assistive technology, persons with disabilities can make use of the technological revolution [14].

Assistive technology in the education of people with disabilities is more of a need than a luxury. People with unique needs are the ones who require particular consideration. They require particular practices in order to meet their fundamental learning demands and develop to their full potential. According to [15] assistive technology can make significant improvements in the lives of special needs people,

allowing them to compensate for physical or functional limitations caused by disability while also allowing them to improve their social, education, and economic integration.

AT used to educate students with special needs will significantly increase teachers' confidence to teach students with disabilities [16]. Recommends using AT as a form of adaptation that will be more meaningful for students with disabilities. Teachers who participate in using AT will find it more likely to teach students with disabilities. [17] examined the barriers that children with autism or other developmental delays face in daily routines such as bathing, morning rituals, lunchtime, or playtime examined, and the challenges caregivers face when using assistive technology to help solve these problems. Caregivers of Saudi Arabian children with autism or other developmental disorders were surveyed and recruited using purposive sampling for the Saudi Arabia study. Caregivers were asked to complete a web-based survey on their experiences utilizing assistive technology during routines. Participating caregivers reported using assistive technology to solve problems with physical activities, playing with the children, bathing, and morning rituals.

Teachers' characteristics (e.g., teachers' technological experiences, level of education, teacher experience, and gender), school features (e.g., school technology support and access), and contextual variables all had an influence on teachers' use of technology in classrooms [18]. According to the study, teachers' use of technology was "positively impacted by teaching experience with technology, availability to technology in the classroom, and teacher confidence and comfort with technology," according to the findings, whereas years of teaching experience and grade level were negatively influenced.

The research used apps to help students with impairments were examined in a survey conducted by [19]. One hundred fifty-one instructors responded to the poll regarding the usage of apps in the classroom. Apps are mainly used for content education. The participants either search for applications online or utilize apps recommended by their co-workers, depending on their preference. In general, most of the instructors who took part in the survey agreed that using apps is crucial. In addition to the fact that some applications offer entertainment elements, educational experts have asked if the apps can be used for collaborative planning between families, IEP teams, and educators.

There is evidence that children with severe motor problems can benefit from utilizing an inclusive approach [20]. Many hands-on activities, which are essential for conceptual comprehension, are now out of reach. The researchers selected 18 teachers, nine average education teachers, and two special education teachers. These educators chose nine kids with significant motor problems. From three and a half months to six and a half months, the students ranged in

age. Both virtual and real robots were used in the investigation by the research team. A virtual classroom or an actual classroom might be used to practice navigation

C. Barriers of Assitif Technology

Barriers related to all three characteristics, such as ease of use, dependability, and comfort, were discovered in the research and resulted from 'poor' design. The concept of 'good' or 'poor' design is subjective, and what a designer views as 'excellent' owing to satisfying design criteria may not meet the demands of consumers [21]. Users desire easy-to-use and handle AT [22]. The user's decision to employ assistive technology would be impacted by how easy it was to set up the device. The dependability of a device refers to its capacity to work consistently following its function. Poor dependability, such as when the device sends misleading notifications or performs a function inconsistently, leads to low trust in the functioning of assistive technology devices and waivers [23]. The device's quality was also cited as a hurdle by consumers and its reference to devices that quickly broke because they were too fragile or not sturdy enough for the intended function of the assistive technology [24]. Assistive technology must be more beneficial than past or current solutions for it to be accepted by users. Participants expressed worries about their confidence and safety when utilizing the device. In this case, the user was unsure how to utilize the assistive technology or was concerned about their safety or privacy [23].

Users cited the physical shape, size, and weight of a device as a barrier to utilizing it. For example, assistive technology that is too large or bulky to carry was cited as an example of a problem [22]. In addition to aesthetics, several users said that their assistive technology was not usable because of its aesthetics. Users were concerned that the device appeared too medical and not mainstream enough, making them feel stigmatized and humiliated about using them. Users cited the physical shape, size, and weight of a gadget as a barrier to utilizing it. For example, assistive technology that is too large or bulky to carry was cited as an example of a problem [25]. Because of its design, certain situations were not suited for using the device because of its design. A user's house may be constrained due to limited areas and carpeting, and the weather outdoors. Devices that were not suited for the local environment, such as dirt roads without paved roads or footpaths, or that were unsuitable for the local linguistic and cultural demands were other examples of unsuitability [25].

Another issue with assistive technology design is the lack of customization to the demands of the end-user. Users and prescribers noted how a universal design or one-size-fits-all approach to assistive technology design was insufficient to meet each user's unique demands and circumstances [26]. Last but not least, participants and services must pay for the original

equipment and ongoing upkeep. Compared to regular items and technology, assistive technologies considered medical devices were viewed as being prohibitively expensive [27].

D. Information Barriers

This subject includes the descriptive themes linked to knowledge of and information about assistive technology. A lack of training and instructions offered to the end-user, family, and caregivers about the safe and appropriate use of assistive technology was a barrier to individuals using their assistive technology. A lack of training and instructions includes a lack of written information or a lack of time spent familiarizing the user with the device [23]. The lack of information about the products and services accessible to users, family members, and caregivers hampered their ability to utilize assistive technology. Users were uncertain who was in charge of supplying the equipment, access to the services, and what equipment was accessible [28]. Information overload describes users and carers who were given too much information about products and services available. The overload of information meant people struggled to manage and understand all of the information provided, and as a result from individual's felt overwhelmed, so they retained very little information [23]

E. Service Provision Barriers

Common obstacle to adopting assistive technology. According to the users, no detailed follow-up was provided after the device was delivered to check it and facilitate its continued usage. When equipment broke, there was no maintenance or repair support [24]. Users' acceptance of assistive technology depends on the time of their involvement. The user's condition had worsened beyond a point where the device was beneficial. Thus it was delivered too late. This issue was frequently brought up regarding long wait periods for appointments and equipment delivery [22]. Before the equipment supply, there was no testing to see if the device would operate in a user's real-life setting. Many users wanted to check out equipment in diverse situations before deciding if it was right for them but could not do so [24].

F. Psychological Barriers

Understanding the psychological mechanisms that allow their usage is as essential as the device itself. People's acceptance of their need for assistance and their unfavorable opinions of assistive technology were both recognized as psychological obstacles in the review. A user's own beliefs and perceptions function as a barrier to accessing and using assistive technology and are included in the psychological theme group. Assistive technology was hindered by the end user's unfavorable attitude towards technology and assistive technology. It was the individual's personal attitude that affected the usage of technology when the end user did not want to utilize it because he or she thought it was

obnoxious, unpleasant, or inappropriate for them [12]. Previous bad encounters with assistive technology impacted the user's adoption of the present assistive technology. In the past, the user may have been disappointed with a service because it did not operate properly [22]. It is possible to improve the chances of future use of assistive technology by creating good experiences. It is possible to foster good experiences with assistive technology by altering the view of it as a facilitator rather than linked with a loss of function. Along with providing the appropriate assistive technology, positive psychological support must be considered while overcoming technological hurdles.

G. Network Barriers

A close-knit support network, such as family and friends, might affect a person's decision to purchase and use assistive technology. Use of assistive technology by the user may be influenced by the unfavorable views of family and caregivers towards assistive technology. Users' attitudes are influenced by the view of family and caregivers that equipment is not wanted or needed [23]. There was also a concern about the lack of participation and inclusion of family and caregivers in the prescription, distribution, and assistive technology training. However, if family and caregivers are unwilling to embrace assistive technology, users will lack the necessary assistance to learn and get comfortable with it, preventing them from becoming independent users [28]. Users also wanted to learn how to utilize assistive technology from others who had comparable problems and had first-hand experience, rather than from therapists and equipment providers who could just provide information. As of now, consumers believed that there were few avenues for them to get peer assistance [6].

H. Society Barriers

Descriptive topics are collected under this heading and relate to social barriers to access and usage of assistive technology. Assistive technology users frequently feel stigmatized by society. Individuals who used assistive technology in public felt vulnerable, self-conscious, and humiliated because of the unfavorable opinions of others [6]. Some individuals avoid using their assistive technology in public because of this stigma, which begs the issue of how we might make assistive technology appear less medical and more mainstream. Promote the adoption of assistive technology by changing public perceptions about assistive technology and disability in general. Social stigma in assistive technology might be adapted and used in more mainstream settings, its aesthetic appearance could be improved, and information techniques to increase the public's knowledge of the technology could be implemented. Again, we show that including end-users in the design process may have a significant impact the stigma linked with mental illness must be eliminated. The economy was the final subtheme concerning societal obstacles, which was

addressed in the report. People could not acquire assistive technology due to widespread poverty and a lack of finances.

IV. CONCLUSION

Appropriate assistive technology that meets the needs of all users with special needs should be made available to create a genuinely inclusive classroom. Access to assistive technology can help minimize educational disparities and be a vital instrument in facilitating a student with special needs in the classroom. This literature study aims to identify common barriers to assistive technology to build access to education for students with disabilities. Findings show this problem is strongly influenced by many factors relating to various aspects of assistive technology design, attitude Individuals, and educational services. Various evidence shows that individuals want to be more adapted to their assistive technology needs so that more significant involvement in their learning is expected to be better. While assistive technology must be implemented individually and must encourage adaptation technology to meet individual needs. Exploring how individuals adapt strategies and assistive technologies to meet their needs requires further research.

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