

Review of the Effectiveness, Challenges, and Supports of Assistive Technology for Students with Disabilities

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Abstract

This Literature review focused on the use of assistive technology and students with disabilities in classrooms and other educational settings. This paper sheds lights on the effectiveness of the use of assistive technology in teaching students with disabilities, challenges that teachers and other service providers face when using assistive technology in teaching students with disabilities, and also the support needed by teachers and other service providers to effectively and successfully use assistive technology with students with disabilities in classrooms and other educational settings.

Keywords: Assistive technology, review, disabilities, students, challenges, support, effectiveness

1. Introduction

Technology has drawn a lot of attention from educators due to the fast-growing presence of several applications and technologies that can be used in educational settings, and it is important in school settings (Wong & Law, 2016). According to Leddy (2010) and Wehmeyer et al. (2011), technology is currently seen as a crucial component of education in schools. Students of today's age rely on technology more and more in their academic lives. Martin (2006) asserts that employing technology is necessary for educating today's pupils for the future. In other words, it must be incorporated into their educational activities. Students rely on their teachers in the classroom to give them the right resources and teaching methods so they can learn. The use of technology in the classroom and its integration by teachers are therefore crucial.

Numerous studies have demonstrated the value and usefulness of technology in the classroom (Garner & Campbell, 1987; Dyal et al., 2009), and the sophisticated use of technology in education has transformed how children learn in classrooms (Furio et al., 2015). Therefore, learning environments for students in a range of disciplines can be more active and engaged, and students can be even more effective (de Koning-Veenstra et al., 2014). Helping people with impairments become more autonomous is one of the most important purposes of using AT with them (Mechling, 2011). According to the World Health Organization (WHO; 2017), around 1 billion people worldwide require AT. This number might rise.

Students with mild to moderate disabilities are also eligible to use and gain from AT programs and equipment. Learning difficulties, behavioral problems, and modest intellectual disabilities are all referred to as "mild disabilities" (Edyburn, 2006). In school settings, students with certain disabilities may need a range of services in various contexts. They might struggle with things like reading, writing, math, paying attention, and memory (Meese, 2001). So, some of these challenges might be lessened with the use of assistive technology services and devices.

2. The Effectiveness of AT

The opinions of 393 professionals and teachers, in a survey conducted by Chambers et al. (2018), in the USA, Australia, UK and Canada were overwhelmingly favourable. Many studies (Cannella-Malone et al., 2015; Davies & Stock, 2012; Dyal et al., 2009; Edyburn, 2006; Palmer et al., 2012) demonstrate the advantages of using AT devices among people with disabilities. Because of the advantages and significance of AT in their life, legislation, and regulations have been promulgated to guarantee accessibility to AT for people with disabilities. AT is crucial to the teaching of people who have severe intellectual and developmental disabilities (Jones et al., 2015). According to Garner and Campbell (1987), AT can be utilized to strengthen communication skills and other skills in students with disabilities by integrating them with their classmates without impairments. Additionally, accessing normal education, whether inside the classroom or participating in several activities, can be made possible via AT devices and services (Dyal et al., 2009). Additionally, utilizing AT lessens the challenges that learners with impairments encounter (Blackhurt & Edyburn, 2000). "Technology simplifies life for the majority of people. Technology opens doors for people with disabilities (IBM, 1991, p. 2).

People with significant intellectual and developmental impairments may have more challenges than their peers in specific circumstances. These subject areas include reading, writing, science, arithmetic, living skills, and management abilities. Students who have these impairments need support to live as independently as possible due to the limitations in these areas. For those with significant intellectual and developmental impairments, assistive technology may be a huge help in overcoming these challenges in their social and academic life.

Communication

Communication issues are frequently present in people with significant intellectual and developmental impairments (Jones, 2017). According to the American Speech-Language-Hearing Association (1993), people with communication impairments often show deficiencies in language expression as well as in interpreting and processing verbal and nonverbal signals. These people can benefit from using assistive technology tools and services to develop their communication abilities. According to studies, AT services and tools can help people with intellectual impairments improve their communication skills and satisfy their communication demands.

Palmer et al. (2012) surveyed 1,617 members of families of people with mental disabilities, and the findings revealed that 13% of respondents said their family member with a disability used a communication device to help them communicate with others. 11% of respondents indicated that although their families could use devices for communication, they did not have access to one. Additionally, 54% of the participants who reported that members of their family utilized devices of communication said that they needed more than one device. According to Palmer et al. (2012), the use of such devices has generally grown among people with intellectual impairments aged 1 to 22 years, from 20% to 24% in the last decade, and for those aged 22 years and older, from 4.9% to 7%. Al Faraj and Kuyyini (2014) concluded by saying that people with Down syndrome who use AT have improved communication abilities.

Reading

Individuals with significant intellectual and developmental impairments have different reading abilities and skills from their counterparts. Reading difficulties are common in people with Down syndrome, which is linked to intellectual disability (Feng et al., 2008). Despite the fact that they lag behind their age by two years, Feng et al. (2008) predict that as they become older, this gap could widen. According to Feng et al. (2008), research conducted in the United Kingdom revealed that 35% of pupils with Down syndrome were illiterate by the time they were 8 or 9 years old. Additionally, learning to read presents greater challenges and impediments for people with intellectual impairments than it does for their counterparts (Van Wingerden et al., 2017).

The demand for AT services and tools increases when people with severe intellectual and developmental impairments encounter obstacles and challenges when reading. Using visuals with words and texts can help teachers of children with intellectual and developmental impairments educate their kids to read and lessen their challenges (Cannella-Malone et al., 2015; Wisconsin Assistive Technology Initiative, 1998). Additionally, Al Faraj and Kuyyini (2014) found that employing AT in reading instruction with these kids might encourage them to read more. Another benefit of adopting AT in reading instruction is that it can help children with intellectual and developmental impairments access the same curriculum as their classmates, improving their integration into the classroom (Wood, 2015).

Writing

Early childhood is typically when students with disabilities in public education settings experience writing challenges (National Center for Educational Statistics, 2011). According to Lancioni et al. (2012), writing challenges are even more severe for students who have severe disabilities. These children might not be able to write with standard tools or a normal computer because of their motor and cognitive deficiencies (Lancioni et al., 2012). According to research (Sitko, Laine, & Sitko, 2005), AT can be one of the most effective approaches to help kids with these impairments and enhance their writing. For instance, children with significant intellectual and developmental impairments who are able to use the regular computer keyboard can write more quickly and easily by utilizing a word-processing tool that anticipates words for users (Edyburn, 2006, Antonucci et al., Williams 2002; 2006; Bouck et al., 2015). Other students can utilize pointing devices or a head-operated joystick if they are unable to use the standard computer keyboard (Brodwin et al., 2004; Evans et al., 2000).

3. Challenges to using assistive technology

The usage of AT services and devices by special education teachers and their pupils is constrained by a number of difficulties. Naturally, this restricts the advantages that students could get from utilizing AT in the classroom. These obstacles significantly hinder the fulfillment of intended educational objectives. In this way, the obstacles to AT usage have been researched and addressed globally. Many studies have found that students with disabilities in schools are not using AT devices and services as much as they could. This is because special education teachers face barriers that prevent using such technologies with their students (Chambers et al., 2018; Davis et al., 2013; Flanagan et al., 2013).

Teachers' expertise, attitudes, and capacity to manage and effectively use AT are some of the most crucial aspects of utilizing AT with kids who have significant intellectual and developmental impairments. According to Michaels and McDermott (2003), "almost universally in agreement" exists among researchers that "the success of students with disabilities with AT is related directly to the AT knowledge, skills, and dispositions of special education teachers" (p. 29). However, some research (Alkahtani, 2013; Al-Moghyrah, Ajuwon & Chitiyo, 2016; 2017; Bausch & Hasselbring, 2004; Hawsawi, 2007) have noted a dearth of awareness among special education instructors about the usage of AT.

The following are the duties, abilities, and information that AT providers should possess when taking into account AT for students with impairments, according to Bausch and Hasselbring (2004):

(a) Assessing or evaluating pupils who have received an AT referral. (b) Align pupils with the most suitable equipment. (c) Speak with the school administration and/or specific instructors. (d) Teach families, instructors, and students how to use a particular gadget. (E) Work together with the IEP team. (F) Give school staff members professional development trainings. (G) Invest in equipment. (H) Work with other members of the faculty to integrate students with disabilities into regular education classes. (I) Modify the curriculum and adapt it. (J) Monitor and assess the application of AT. (p. 101)

In other words, those who offer AT services, such as teachers, cannot completely benefit children with disabilities unless they possess such skills and complete the necessary competencies, or as

Bausch and Hasselbring (2004) called as "job responsibilities." A second survey reveals that among 30 distinct AT items, the majority of special education instructors could only identify the low-tech items and that over 80% had an interest in participating in training programs based on AT (Wahl & Buzolich, 2001).

Typically, training programs may be used to acquire these abilities and information. But another significant barrier is connected to the lack of training among educators, families, and other support staff. (Davis et al., 2013; Chambers et al., 2018; McGregor & Pachuski, 1996; Flanagan et al., 2013). Numerous studies have shown that special education instructors lack training in the use of AT devices. According to Alkahtani (2013), 92.9% (n = 118) of the instructors who took part in it never went to any AT training. According to Ribeiro and Moreira (2010), 84% of instructors lacked AT training.

Bausch and Hasselbring (2004) asserted that pre-service AT training programs are insufficient based on the findings of Wahl's (2002) research. If these programs are not enough, pre-service teachers in special education could not be adequately prepared to employ auxiliary aids with children who have impairments, which could provide a barrier for them and their pupils once they start teaching.

The lack of skilled personnel who can support instructors and their students in utilizing AT is another issue that teachers of students with impairments may have when thinking about using AT with their students in classrooms (Bausch & Hasselbring, 2004). The majority of the time, members of the individualized education plan team and school personnel are not well-equipped to determine if kids require AT services and devices (McGregor & Pachuski, 1996; Todis, 1996). According to a 2000 National Council on Disability research, to maintain their independence and productivity, more and more elderly people and people with disabilities find themselves needing assistive technology, yet access to professionals who can help them acquire such equipment is restricted. We are falling increasingly and further behind the demand for people with knowledge and abilities in assistive technology, despite modest expenditures being made in this area (Barrier: awareness and competence section).

There have been documented in the literature additional obstacles to utilizing or gaining access to AT devices and services. The less access to and incapacity to utilize AT devices is one of the often-encountered obstacles. According to some sources (Bausch & Hasselbring, 2004; Davis et al., 2013), the abundance of AT devices might be a hindrance. More than 20,000 AT devices can be utilized in classrooms to help children with impairments, according to Davis et al. (2013). People working with disabilities may find it difficult to keep up with the new AT devices as their numbers grow, but they must do so in order to benefit from them (Judge & Parrette, 2016; Bausch & Hasselbring, 2004; Davis et al., 2013).

In inclusive schools in Riyadh, Saudi Arabia, Al-Moghyrah (2017) investigated the viewpoints of 50 instructors on the challenges that prevent them from using auxiliary aids (AT) with pupils who have Down syndrome. He discovered that the most often cited obstacle among the participants was that certain professors had a negative impact on their colleagues' usage of assistive technology. Additionally, it was claimed that schools lacked effective AT equipment. In Saudi Arabia, the majority of AT devices did not support Arabic-language software. Teachers also mentioned that obstacles included a lack of class time, a lack of AT training programs, and a lack of parent involvement.

Ajuwon and Chitiyo (2016) did a quantitative study to explore the obstacles and problems special educators in Nigeria experience in relation to AT. 165 special educators were polled by the researchers. They discovered that there were several concerns, including a lack of AT training, a shortage of AT in classrooms due to financial constraints, unpaid maintenance fees, a lack of curricular integration, and a lack of electricity to power the AT. These were the obstacles mentioned in the research the most frequently.

In research done by Alfaraj and Kuyini (2014), it was discovered that Saudi instructors of kids with Down syndrome faced additional obstacles to using technology. In addition to other results, instructors noted a lack of resources, a lack of teacher readiness for technology use, a lack of student AT proficiency, and a lack of Arabic-language computers and software.

In research published in 2013, Flanagan et al. investigated the challenges that middle school special education instructors believed prevented them from using assistive technology (AT) with students with disabilities. Among other data, it was shown that instructors most frequently cited the expensive price of the AT devices as a barrier. Approximately 75% of educators said that the high price prevented them from using AT with their kids. The absence of teacher training in AT was the second most often mentioned cause. A little over 47% of instructors said they needed more training on AT, and 43% of them said they had trouble using it with their pupils. Teachers said that because of barriers including the high cost, difficulty of usage, and limited availability of the majority of high-tech gadgets, they used high-tech less frequently than they used low-tech (Flanagan et al., 2013).

The National Center for Education Statistics, according to Wahl (2002), obtained and examined data about the challenges associated with employing AT devices and services with students who have impairments. The findings demonstrated that among the five barriers identified, the "human resource" and the accessibility of the AT were the most frequent (Wahl, 2002). The results also demonstrated that instructors and administrators who have more experience were more equipped to use AT than those with more recent certificates.

The use of technology by instructors of kids with intellectual impairments was examined by Hawsawi (2007). The researcher created a survey to gather information from 128 male instructors of kids with intellectual disabilities for this descriptive study. The research findings were categorized as impediments affecting students, instructors, and school administration. The following factors were the most commonly cited hurdles affecting teachers: (a) less in-service training on using AT; (b) less preparation in utilizing AT at the pre-service level; (c) teachers' perceptions that using AT involves more work; and (d) a lack of information about AT. A lack of technology guidelines in the curriculum, a lack of technicians in schools, a lack of devices, um, and a lack of emphasis on the value and necessity of using instructional technology in the classroom were the three most frequently cited administrative barriers. The following were listed as student-related technology use barriers: Students misusing technology; teachers believing that students' sensory and physical problems restrict their capacity to utilize technology; and students' cognitive deficiencies making it difficult for them to use technology in the classroom.

4. Resources Needed

There are several things that might impact how well kids with severe intellectual and developmental impairments use and benefit from assistive technology devices and services in schools. These variables can either boost the usage of AT and its efficacy or decrease it. Numerous obstacles have been noted in the literature; these obstacles are regarded as gaps that restrict the usage of AT. It is important to understand the requirement for better and optimal use of AT in order to lower the obstacles that instructors encounter in schools and to close the gap between problems and successful use. Teachers' opinions are therefore crucial in this context. Giving instructors the necessary tools and assistance may help them use A/T more effectively with their pupils (Nam, Bahn, & Lee, 2013).

The biggest demand for resources to ensure the optimal use of assistive technology (AT) with kids with disabilities in schools has been highlighted by special education instructors. Access to training programs was mentioned as one of the tools instructors believed were essential for the effective use of AT in the majority of the studies (Alfaraj & Kuyini, 2014; Al-Moghyrah, 2017; Flanagan et al., 2013; Abner & Lahm, 2002; Chambers et al., 2018). For example, Chambers et al. (2018) reported that 70% of respondents recognized a need for training on the usage of the iPad after surveying 393 professionals and instructors of kids with disabilities. In certain research (Alfaraj & Kuyini, 2014; Al-Moghyrah, 2017), additional resources including AT devices, financial assistance, and technical help were also mentioned as being necessary.

In research carried out by Al-Moghyrah (2017) in Riyadh, instructors of pupils with Down syndrome in inclusive schools identified a number of resources. Teachers said that the AT should be encouraged and included in the curriculum they utilize. In order to purchase the necessary AT devices for their children, these instructors also mentioned that they required additional financial help from the schools. They also underlined the need for pre-service teachers to take AT courses and for in-service teachers to take AT courses to improve their knowledge and abilities. In terms of supplies, upkeep and technical assistance, and ready-made courses for teachers, teachers responded that they require additional help.

Other studies have identified additional resources required for AT usage (Flanagan et al., 2013; Alfaraj & Kuyini, 2014). For instance, according to Alfaraj and Kuyini (2014), when instructors were questioned about the elements that enhance the using technology among kids with Down syndrome, the major tools they reported wanting were iPads and classroom PCs. According to Flanagan et al. (2013), instructors needed more AT training, more time in the classroom to apply AT, resources, and support for using AT.

5. Recommendations and Conclusion

A number of recommendations for further study on AT usage among instructors of kids with severe impairments have been made in light of the studies mentioned above. The findings of research imply that AT service providers should continue their professional growth. Studies found that service providers on AT lack access to professional development opportunities. A qualitative or quantitative research study might be done to better examine the causes of the lack of professional growth because there is a dearth of literature on professional development for utilizing AT. Additionally, it could be interesting to look at the current professional development on AT offered to service providers.

One of the main obstacles to teachers' planning for the use of AT was the lack of teacher collaboration. Other research might thus look into the causes of this lack of cooperation when it comes to preparing pupils for the usage of AT. In order to better understand the link between the curriculum and the usage of AT with children with disabilities, further study should be done through speaking with instructors.

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