

Assistive Technology in Special Education Students and its Impact on Engagement into Education

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Abstract: This paper was displaying the importance of several laws, regulations, resources, and practices that support the understanding of students with disabilities, as well as emphasized the impact of implementing assistive technology (AT) in schools. Also, this paper presented the evidenced-based practices to implement AT and the potential impact on students with disabilities when utilizing concepts such as WATI, Quality Indicators of AT, the assistive technology continuum (high- low tech), and the SETT Framework. Moreover, it provided some of the implications of using AT (i.e., procedures, resources, cost, referral, professional development, attitudes, etc.) toward the integration of AT in school.

Keywords: Assistive technology, special education, IDEA, IEP.

1 Introduction

Technology is constantly changing and has led to innovations that have improved quality of life for a great number of people. Assistive technology (AT), in particular, has had a great impact on the enhancement of students' performance. It has provided learners with facilities that allow them to exploit their abilities. A remarkable characteristic of AT is that students find themselves in a setting where they are actively involved in the learning process in the classroom. In fact, students' success seems to extend to their life in general (Erdem, 2017). Learners with disability encounter a lot of challenges, such as curriculum and information access, that might hinder their academic achievement. As opposed to other learners, these learners, therefore, require special resources and aids which will help them overcome those challenges, among which accessing information. Here is where the importance of AT lies. In education, AT is considered a significant asset to students with disability today (Bruinsma, 2011). In addition, it is important to analyze the laws, regulations, resources, district practices, and theoretical understandings for both disability and special education in order to assist and find solutions for students with disabilities.

A T in Special Education

AT is considered to be any device or service that contributes to helping a student with a disability meet his/her needs or achieve individualized education program (IEP) goals, as well as enabling the student with a disability to participate in the most general education settings possible. According to the Individuals with Disabilities Education Improvement Act of 2004 (IDEIA also known as IDEA), an AT device is defined as "any equipment that improve the functional capabilities of a child and specifically excludes a medical device that is surgically implanted or the replacement of such device" (Mittler, 2007, p. 83). Also, the IDEA defines AT service as "any service that directly assists a child with a disability in the selection, acquisition, or use of an assistive technology device" (IDEA, 2004). These forms of AT go hand-in-hand because success for a student is not only dependent on access to a device but also on having the support and services needed to use it effectively.

Laws and Regulations: Understanding AT in Schools

An offshoot of the educational system arises special education as a unique learning system which millions of students attend every year, enjoying the special services provided by the schools which entertain this type of education. There seem to be mixed connotations of the term *special education*. Some people associate themselves with the label; others look at it as a term referring to people with disability.

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According to the United States Department of Education, a student attending special education is one, between the age of 3 and 21, who receives individualized instruction to meet their needs. In the United States, people with special needs get both educational and social support (Yell, 2016).

'Segregation', 'self-containment', and 'inclusion' are among the concepts associated with educating with students with disability. AT incorporates these in schools to enhance students' performance. In early 20th century, advocacy groups, created by parents, helped publicize special education. As President John F. Kennedy appointed the Panel on Mental Retardation in 1961, these groups developed. The panel, which consisted of 26 members, allied itself with the parents' advocacy movement and initiated a new legislation that developed Public Law 88-164. The law, supported by the panel, saved federal financial aid to the states and financed developmental research on mental retardation (Bailly & Nick-Torok, 2011). In 1965, President Johnson signed the Elementary and Secondary Education Act (ESEA; Hewitt, 2011). The act ensured funding for elementary and secondary schools serving children with disability. As the advocacy groups' petition for securing more access to children with special needs to public education, the funding was mainly directed to primary education. Although public awareness of special education was being raised, parents had a few options available to aid in their children's education. Many schools still did not entertain special education programs, and often students either did not receive appropriate care or were denied attendance (Johnson, 1965). At that period, students with disability were segregated from other students. Also, knowledge of AT for students with disabilities did not exist and this may be due to lack of awareness or the high cost of AT at that time. In the 1970s, however, inclusive placement came to the fore as people started to call for civil rights for students with disabilities (Osgood, 2005). This enabled students with disabilities to go to special classrooms, although segregation was still applied. Then arose the concept of self-containment – having a specific design of classrooms for students with disability, especially for those students how take longer to interact with peers in the general education environment (Bettini, Kimerling, Park, & Murphy, 2015).

These developments helped pass the Education for All Handicapped Children Act (EAHCA or EHA), called Public Law (PL 94-142). This was one of the most significant laws that pushed forward the accessibility of special education and the use of AT. For instance, in 1975, EAHCA was implemented, achieving multiple goals related to assisting the learning process and socializing of students with disability. Additionally, this act reinforced decisions related to providing appropriate services, equal access to education, and federal funding to states to teach students with disabilities (Yell et al., 1998). In 1990 the Congress in United States replaced EAHCA with IDEA (Individuals with Disabilities Education Act) (Bicehouse & Faleta, 2017). According to IDEA, schools with least restrictive environments (LRE) could educate students with disabilities alongside non-disabled students in the same classroom, with the possibility of segregation in situations where students get overwhelmed. A salient implication here is that of inclusion, not merely sharing space in isolation, promote by inclusive practices. Depending on nature of students' disabilities, schools should utilize supplemental aids and services in order to teach them in the LRE, and ascertain that students get their free suitable public education that meets their individual needs. Further, the school district must secure an array of substitute positioning choices to meet the students' needs, including facilities in the public education classroom, resource access, self-containment, and residential facilities because these options would enable the school staff to decide on the most serving LRE for each student (Yell, 2016). In 1975, however, the law approved of the inclusion of students with disability in general education classrooms (U.S. Department of Education, 2010). Wilson (2004) notes that 41% of young students with disability felt to be deprived from participating in activities inside and outside the school due to their disabilities. Inclusion, as rightly pointed out, is to ascertain that students with disability feel they are part of the school community and are accepted by others; they should be able to participate with peers. (Schwartz, 2015).

The IDEA asserts that securing free and appropriate public education (FAPE) is a fundamental right to every child, apart from disability, or otherwise. Six principles have been reported to protect this right, especially to students with disability: "zero reject, non-discriminatory evaluation, appropriate education, least restrictive environment, procedural due process, and parent and student participation" (Turnbull, Turnbull, Wehmeyer, & Shogren, 2016, p. 29).

At this stage, interacting with peers and using AT would help students with disability a lot. Thus, the effective use of AT devices with students with disabilities in order to achieve inclusion is considered one of the best tools that afford students multiple opportunities to learn new information, interact with peers, support participation and feel welcome, and promote academic growth (Choi, Johnson, & Kriewitz, 2013). Students actually favor being around with other students who are their age, which permits them to engage and collaborate with them in the classroom. (Bateman, Bright, O'Shea, O'Shea, & Algozzine, 2007). For instance, Jeremiah is seven years old and had a significant disability. He studied in an inclusive classroom in second grade. He used a voice-output communication aid (VOCA) and electric wheelchair to participate with his peers. His general and special education teachers used accommodations and modifications for him to adapt the curriculum. The use of AT in inclusive classrooms helped him with literacy and communication with his peers to gain a rich academic and social life (Ruppar, 2013). Thus, AT devices play an essential role in the inclusion process.

According to IDEA key principles, FAPE refers to special education and the services offered by the public. Entertaining FAPE in schools allows teachers to make sure that the educational assists presented to students are meaningful and support appropriate education (Yell, 2016). As for the Quality Indicators for including AT, IDEA demanded that AT be delivered after the IEP team assesses that a student needs to get (FAPE) in the LRE. Interestingly, AT can be implemented in any context, i.e., whether students have disability or not. The AT plan should include guidelines on which AT devices and services to use, how AT will be used in the home, school, and community environments, how the students, teachers, and parents will be trained on AT, and how AT will be monitored and evaluated. Feedback-based evaluations on AT performance for students will impact decision making by determining whether students like their AT and whether or not they feel their AT is helpful. Observations will establish the extent to which students use their AT and appear engaged and interested in using their devices, and will help determine whether the AT helps or hinders student performance on the intended tasks (Ohio Center for Autism and Low Incidence [OCALI], 2013).

Moreover, a remarkable merit of promoting AT in schools is that it could narrow down the opportunity gap between non-disabled and disabled students. The IDEA necessitates that schools should admit students with disability to LREs to receive appropriate education, and secure supplemental aids and assists to meet individual needs of the students (Yell, 2016). further, AT advances social integration and encourages students to exercise tasks on their own . It also has a favorable impact on student achievement. Therefore, it is crucial for teachers to understand how to accommodate AT to meet their students' needs. By adopting AT, students get to work more quickly and more accurately. They also become more independent in communication, listening, mobility, recreation, and daily activities. Further, AT boosts students self-confidence, allowing them to work on their obstacles and keep pace with their peers as they carry out some tasks. (Stanberry & Raskind, 2009). Furthermore, AT is useful for teachers in schools in many aspects, such as (a) giving teachers more freedom and possibilities by using different tools that incorporate images, videos, smart boards, websites, apps, and programs in order to reach their students; (b) helping teachers determine the tools that meet each child's needs, for instance, providing text-to-speech devices to students who are nonverbal in order to present their learning to the class; and (c) saving time, where a teacher could teach a different topic and work one-on-one with other students.

The IDEA is considered one of the most important acts of legislation that has assisted in accessibility and decision-making for students with disabilities regarding AT. The Assistive Technology Act (ATA) adopted in 2004 indicated the importance of the provision and improvement of AT for all individuals with disabilities, no matter their ages. Also, the ATA afforded states the opportunity to use financial assistance to support programs designed to work with children with disabilities and anyone who requires AT devices and services (Tshiswaka, Clay, Chiu, Alston, & Lewis, 2016). Thus, this law illustrated that the states play an important role and is considered a guideline for the implementation and development of AT.

Additionally, it is essential to consider Section 504 of the Rehabilitation Act of 1973 regarding the use of AT in special education. Section 504 defines an individual with disability as a person who cannot participate or have limited participation or engagement in everyday activities due to physical or mental constraints (Bateman et al., 2007). The legislation emphasizes that people with disabilities are entitled to get unique resources and assists that would help them participate in everyday activities or learning tasks. The legislation extends to any organization that is federally sponsored, including nursing homes, hospitals, mental health centers, and human service programs. Also, Section 504 addresses employers, stating that they must provide equal opportunity to all working staff, irrespective of what disabilities they might have (Colorado, 2008). Not only this, but as per the Americans With Disabilities Act (ADA) of 1990 , students with disability should get equal opportunity with non-disabled in relation to general education access, public services, employment, and transportation (Zappa,1990). All these acts of legislation now emphasize that disability aside, each individual has the right to an education. Accommodations in Section 504 include providing AT to students in order to guarantee their fundamental right to a FAPE.

In addition, the No Child Left Behind Act (NCLB), Public Law (PL) 107-110 can be viewed as a broad education law to improve on the ESEA. Specifically, the NCLB emphasizes responsibility and appraisal. It requires that states show adequate yearly progress (AYP) to indicate student achievement. It also demands that students with disabilities take part in state tests (Kim & Sunderman, 2005). In December 2015, (NCLB) was substituted with the Every Student Succeeds Act (ESSA). The ESSA was meant to be tougher and deal with more aspects than previous laws to hold states responsible for introducing and executing their own criteria and education programs (Darrow, 2016). While such laws center on adopting and promoting the use of AT in schools, the constant updates over the years target better execution of AT, with the aim of enhancing the quality of AT apparatus and aids for students with disabilities. These laws provide a successful framework to continuously improve AT implementation.

AT Implementation Practices

Many studies have focused on the best methods to utilize and implement AT in order to help students with disabilities as well as professional development for teachers and parents. Thus, there is a variety of evidence-based practices that play an essential role in implementing AT for special education teams which encourages students with disabilities to be successful in their tasks. Thus, to improve services and implement AT, an effective plan must be created to cover the specific needs of individuals with or without disabilities by a specialized AT team. This specialized AT team has the responsibility to solve any issue related to AT and ensure that all students have every opportunity and support for using AT in order to be successful. In general, the administrator is always playing an important role in any organization to lead the team to success. It is important for them to create a framework that helps to identify the appropriate type of AT for each student while taking into consideration the student's race, religion, age, and culture to successfully apply AT. Thus, implementing AT usually requires collaboration and reliance on existing frameworks to promote the use of AT, such as the SETT Framework (Zabala, 2005). The SETT Framework is considered a tool that helps teams collect and organize information that may be used to encourage collaborative decision-making regarding AT services designed to promote the educational success of individuals with disabilities. Teams require data on students and their environments in order to identify students' strengths and weaknesses. This will enhance their ability to choose the appropriate AT that will contribute to students' educational success. The SETT Framework supports the determination of AT that is used in educational settings, as well as its implementation and effectiveness. Thus, the application of the SETT Framework focuses on four parts: students, environments, tasks, and tools (Zabala, 2005).

The SETT Framework first focuses on students, as it requires teams to identify the functional area of concern such as student inability to complete a task independently based on level of difficulty or related to his/her abilities. It also focuses on identifying student interests that motivate them. The second part of the SETT Framework involves identifying the environments in which the student functions. It is required that special education professionals pay more attention to the environments surrounding their students by evaluating multiple aspects such as the classroom and instructional arrangement, materials and equipment, and the availability of support for both student and teachers in order to develop a strategy for implementing AT. The third part of the SETT Framework focuses on identifying and analyzing the tasks that students are required to complete based on how they communicate through the use of AT devices. The final part of the SETT Framework is used to determine the specific tools necessary to help students improve their skills in order to lead to academic success. Thus, there are many tools that the SETT Framework defines for use with the students such as "devices, services, strategies, training, accommodations, and modifications" (Zabala, 2005, p. 2). The SETT Framework is considered useful as it helps teams with AT assessment and implementation, several researchers have noted the short-term and long-term positive impact of utilizing the SETT Framework on learners with disabilities. The SETT Framework has multiple advantages, including positive outcomes on students' performance and affording all students opportunities to participate, no matter their situations. Additionally, it helps teachers to observe their students using different tools to accomplish their tasks and to evaluate them. In general, by using the SETT Framework, the specialized teams and teachers involved in the process of obtaining AT for students will get a whole picture of each child as it relates to students' needs, strengths, and areas of concern in order to determine what type of AT would be best for them and help them to accomplish their tasks.

The primary purpose of the Wisconsin Assistive Technology Initiative (WATI) is to support school districts to guarantee that children and youth with disabilities have equal opportunities to access AT devices and services when they need them. WATI helps yield better results and outcomes for children with disabilities by using AT for accessibility to services, curriculum, and school and community activities. Also, it aims to provide professional training and strategies to raise the capacity of school districts to use AT services for free. WATI was designed in the fall of 1993 after numerous school districts sought to get technical assistance in implementing AT and using it in an appropriate manner (Wisconsin Assistive Technology Initiative [WATI], n.d.). Sufficient and effective knowledge of special education for teachers about the use of AT devices is considered a short-term impact of the implementation of WATI. The long-term impact of the implementation of WATI encourages collaboration and training between AT service providers and teachers to enable them to access resources to support and provide students with the newest AT equipment. WATI focuses heavily on teachers and their training, which has a positive impact on students with disabilities, as the students show their capacity to use AT devices correctly. While the initiative of WATI is supporting and enabling students with special needs to use assistive devices, it also enables teachers who gain sufficient knowledge of implementation practices to work under any situation, whether a psychological or physical condition, to the capability of using appropriate strategies and tools to promote student success.

The Quality Indicators for Assistive Technology (QIAT) help teams in implementing AT devices and services and promote and improve the quality of AT services that are provided in special education to support students who use AT to complete their tasks and participate in the activities that occur in their educational environments. There are seven QIAT components that are used to decipher the effectiveness of AT implementation. First of all, the team involved in

the implementation is required to collaborate in creating a written action plan that explains in detail how to apply AT in educational settings, which AT devices and services to use, and who is responsible for implementing them and overseeing their use. The second component focuses on the integration of AT in educational settings and the extent of availability of AT in daily activities to facilitate students' access to the curriculum and educational activities. The third indicator focuses on the roles and responsibilities of everyone who works with the student in all environments to implement and provide the AT and enable students to use it. The fourth quality indicator focuses on persons who support and provide students with different strategies when these students cannot participate or complete tasks on their own; they enable students to determine the appropriate AT to use. The fifth indicator provides learning opportunities and support for students, students' families, and teachers on how the AT will be used in educational settings. The sixth indicator considers the required amendment, improvement, and implementation of AT based on formal and informal student assessment results in order to support them in the academic progress. Finally, an important part of AT implementation is the management and maintenance of equipment and materials, which requires identifying the responsibility of each management team to maintain the quality of AT (Quality Indicators for Assistive Technology Implementation [QIAT], 2012). Thus, these indicators could have a positive effect on students with disabilities in the short term and long term. They play an essential role in providing a clear picture for AT teams about selecting and delivering AT devices and services, as well as considering students' concerns regarding the implementation of appropriate AT strategies. In the long term, these indicators could be considered as standards for all AT service providers. Additionally, these indicators help teams to design effective plans for helping students to use appropriate strategies to play an active part in the educational process as well as helping students and families play an important role in evaluating the quality of AT plans and services.

The Assistive Technology Continuum of Low to High Tech Tools was designed to remind AT providers that AT need not be expensive or complicated to make a difference in learning. By using low-tech and mid-tech options before recommending high-tech solutions, students can still receive support in completing the required curriculum. Thus, AT devices are considered tools that help students with disabilities meet their needs and match their abilities. However, these devices fall into a range of categories based on costs, complexity, and accessibility from low tech to high tech (Eichleay & DuBuske, Boston Public Schools Access Technology Center, n.d.). Low tech is the most common form of AT because of the reasonable cost of these devices and materials. These technologies include items such as pencil grips, highlighter pens or tape, visual schedules, large-print books, wrist rests, and communication picture boards. Mid-tech is the next form of AT that is more complex than low-tech but still moderate cost, and includes items such as timers, adapted keyboards, talking calculators, tape recorders, speaking homework wiz technologies, electronic spellers, or dictionaries. High tech is the most expensive and complex form of AT and includes items such as alternative keyboards, electronic books, augmentative and alternative communication (AAC) devices, smart board software, portable and software word processors, and software programs such as text readers, text to speech, and screen readers. Thus, these lists of AT devices help and encourage AT and IEP teams to select which devices match students' abilities while potentially being cost effective.

2 Implications

Based on the sources used to address this paper's topic, there are multiple factors that contribute to impact the integration of AT in schools. Special laws and regulations are considered one of the sources that safeguard the rights of students with disabilities, protecting them from isolation and helping them participate in their school communities. There are resources that provide training for special education teachers and use various materials such as the low-tech and high-tech AT in order to enable students with disabilities to access and succeed in the educational system regardless of their abilities. In addition, some factors that contribute to and impact the education of students with disabilities are evidence-based practices and frameworks, which encourage the creation of action plans to develop and implement effective strategies for IEP teams, as well as the use of quality indicators that could serve as guidelines to evaluate AT implementation. Thus, these factors play an essential role and have a positive impact on AT implementation in schools because they focus on the interests and needs of the students first.

3 Recommendations

IEP teams may face many obstacles when seeking to integrate and implement AT, which may affect student outcomes. Thus, the terms that IEP teams use in action plans may not be clear and understandable. If IEP teams do not specify the roles and responsibilities of everyone who will work with students, this may have a negative influence on the implementation process and on the students' outcomes. To avoid these obstacles, IEP teams should collect and provide extensive information about students' needs and strengths and use this information as guidance for developing their action plans. Also, IEP teams should provide and describe which AT services students need and those services that may focus on training for students' parents and teachers. IEP teams should describe the measurable outcomes and processes that will be used to evaluate students' progress in order to determine whether selected AT is useful and effective for

student participation and achievement. Finally, IEP teams should clearly describe all information including devices and services in AT plans in order to aid anyone who attempts to implement the AT in students' educational programs (OCALI, 2013).

4 Conclusion

There are several laws, regulations, resources, and practices that support the understanding of students with disabilities, as well as emphasize the impact of implementing AT in schools as presented in this paper. For example, the IDEA emphasizes that students should receive a FAPE in the LRE, and Section 504 and the ADA mention that children with disabilities should have equal opportunities and rights to participate in and access general education. Also, there are some evidence-based practices and the SETT Framework that could be used for developing strategies for implementing AT in schools, which would contribute to improving the quality of the programs that include students with disabilities. WATI gives teachers resources to gain knowledge and training in implementing AT and providing opportunities for students with disabilities to access and make use of AT devices and services. Also, the QIAT provide AT leadership teams with full and complete information about their students to determine which strategies, devices, and services to include in the implementation. It is also important that teachers and IEP teams use a mix of low-tech, mid-tech, and high-tech devices and services in implementing AT to support students in meeting their needs. By incorporating these factors presented, the educational system as a whole can be changed by teachers and IEP teams, providing healthy and high-quality environments for students with disabilities to reach their full potential in and out of school.

Conflict of interest

The authors declare that there is no conflict regarding the publication of this paper.

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