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The Importance of Assistive Technology for Students with Disabilities in the Comprehensive Education Schools in the KSA

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Abstract

The purposes of this paper were three-fold: first to explore the importance of Assistive Technology (AT) for students with disabilities; second to discuss how AT-related regulations, practices, and frameworks would ease the learning and social inclusion of students with disabilities as well as promote their accessibility and decision-making processes; and third to identify factors that are promoting or otherwise detracting AT implementation in schools. The paper concludes with recommending a way forward on how to enhance AT implementation as well as to overcome challenges that hinder its implementation.

Keywords

Assistive Technology (AT), Students with Disabilities, Special Education, Implementation of AT, United States, Saudi Arabia

1. Introduction

In the world today, technology has cut across nearly every sector ranging from education to agriculture. Especially in education, technology has impacted positively on children with disabilities as it uses several Assistive Technology (AT) supports and services both at home and school to facilitate the learning experiences of children with disabilities. AT is described as the magic and power of education and communication for students with disabilities (Mavrou, 2011: p. 42). In addition, learning and career opportunities for students with disabilities are likely to be significantly revolutionized in the years to come because of AT (Adebisi, Lima, & Longpoe, 2015). However, any object, piece of machinery, or product system—whether purchased commercially off the shelf, altered, or customized that is utilized to sustain, enhance, or develop a person with a disability, qualifies

as assistive technology (AT). Additionally, assistive technology is a potent tool to boost freedom and enhance involvement when it is acceptable for the user and their surroundings. It enables kids with special needs to grow up autonomously and take part in educational activities alongside their classmates (Viner et al., 2020).

On the other hand, according to Koch (2017), any Individualized Education Program (IEP) must take assistive technology into account and using it could allow kids to stay in the general education setting rather than the more constrictive special education classroom. If the IEP team finds that a child with a disability needs assistive technology to receive an education or to live in a less restrictive environment, the school system is responsible for handling all aspects of providing that technology, including selecting the appropriate device, acquiring it, teaching students and teachers how to use it, and maintaining the system.

However, the everyday life experience of students with disabilities can be changed by means of taking social actions against bias. This impacts AT as a support and a service. In addition, students with disabilities can benefit from increasing the rhythms of inclusive practices, such as the value and use of AT in public schools, school districts, and decision-making circles (Mankoff, Hayes, & Kasnitz, 2010). Also, for pupils who have disabilities, (AT) has many advantages that improve their access to learning resources, involvement in classroom activities, and academic performance. However, there may be more advantages for students with disabilities who use devices in the classroom. These advantages could include improved motivation, autonomous working skills, involvement, engagement, and organization (Nieves, 2021).

In addition, disability constructs influence not only the teaching of different students but also the conception, provision, and application of assistive technology in education (as well as other spheres of life). This frequently affects the goals of AT service delivery, the mindsets of stakeholders, the regulatory framework, methods of teaching and learning, and more. Also, technology is viewed as a solution with a different goal, different application tactics, and a different expected outcome for each of the disability models (medical, social, and human rights). Educational policies and the structures available in learning environments are closely related to the provision of assistive technology (AT) and its integration into the system of education (UNICEF, 2022a).

Moreover, administrative support and professional development (PD) provide the necessary infrastructure and guidelines for supporting students with disabilities regarding utilizing AT (QIAT, 2017). The areas AT occupies within the scope of special education programs are closely related to the role of laws and regulations in the development of accessible educational environments into the Individualized Education Program (IEP) (Dell, Newton, & Petroff, 2016).

The attempt is made in this paper to explore the importance of AT to students with disabilities; to discuss how AT-related regulations, practices and frame-works would ease the learning and social inclusion of students with disabilities as well as

promote their accessibility and decision-making processes; and to identify factors promoting or otherwise detracting AT implementation in schools in the US and generalized to Saudi Arabia. The paper proceeds as follows: after defining AT, theoretical models applied to AT are discussed. Then the paper reviews literature related to selecting AT and the main frameworks employed in this respect (namely, SETT framework; WAT; and Quality indicators). After that, using AT with students with disabilities as well as the best evidenced-based practices to implement AT are discussed. This is followed by reviewing the impact of legislation on assistive technology implementation and putting the way forward.

2. Literature Review

2.1. Assistive Technology: Definitions and Scope

The phrase "assistive technology" refers to assistive devices as well as the associated systems and services. It is referring to any product, equipment or tools, that are commonly mechanical or electronic in kind, which helps individuals with disabilities to keep their independence and develop their quality of life (Shi, 2015). In parallel, it refers to any item, piece of product system, or equipment whether obtained customized, modified, or commercially, that is applied to enhance or improve functional capabilities of children with disabilities (Tamakloe & Agbenyega, 2017).

People with disabilities, the elderly, and those with long-term medical issues can all be included, involved, and engaged in the family, community, and all realms of society—political, economic, and social—with the help of assistive technology (AT). In addition, all major functional areas, including cognition, communication, hearing, mobility, self-care, and vision, can be improved with the use of assistive technologies. They might be digital and take the shape of communication-supporting software and apps, or they may be tangible goods like wheelchairs, eyeglasses and hearing devices (World Health Organization & United Nations Children's Fund, 2022).

Furthermore, AT is a cutting-edge approach that incorporates technology into homes to preserve and even improve the functional health, safety, and quality of life of its occupants. Accessible Technology (ATs) encompasses a wide range of tools, services, plans, and methods designed and implemented to help people with disabilities deal with their daily challenges (Yusif et al., 2016).

Moreover, a wide range of devices and programs (AT) are intended to improve the functioning abilities of people with impairments. Lately, according to Pappadà et al. (2021), AT has emerged as one of the mainstays of health initiatives. Any product or technologically driven service that allows people with physical disabilities to participate in their everyday lives, education, work, or leisure.

2.2. Theoretical Models Applied to AT

The understanding of theoretical models stands essential when dealing with the implementation challenges of assistive technology (AT). These theoretical ap-

proaches develop an understanding about how persons view assistive technology and its relationship with social factors and technological elements. Social influence regarding AT attitudes functions as the first main theoretical dimension while the adoption of technology depends on characteristics and usability for the second main dimension.

Overcoming the challenges associated with AT interventions can be facilitated by a theoretical grasp of issues pertaining to social change and the use of technology. It goes without saying that theories can expound on how individuals perceive occurrences related to AT and disability that are part of educational procedures. On the other hand, the term "access to AT" refers to the fair and continuous provision of assistive technology and associated services that respect the following six essential principles: availability, affordability, adaptability, acceptance, and quality. These standards ensure that assistive items and services are widely available, of high quality, affordable, customizable to match individual needs, culturally appropriate, and accessible (Aldawood et al., 2024).

The theory of social influence (SIT) that originated here asserts that interactions with others, such as video calls, personal conversations, or both, can reconstruct the link among a person and their community. This interaction can be in terms of technology mediated. Notably, the theory contends that social connectivity can positively influence a person's level of social contact due to the person's desires for feeling associated with others (e.g., belonged, linked). This is significant from the perspective of need. Moreover, social influence reflects how community affects the individual, including the manner that society works to mold the person's goals, beliefs, perceptions, values, attitudes, and behaviors (Lim, 2022). In addition, inspired by the theoretical underpinnings underlying three distinct research streams, Social Influence Theory (SIT) provides a framework for examining several motivating factors of attitude change. Furthermore, according to the SIT, accepting social influence can occur in three different ways: conformity, recognition, and internalization. Stated differently, social influence refers to a shift in behavior within social contexts brought about by an individual or a collective (Davlembayeva & Papagiannidis, 2024).

Through SIT we gain necessary tools for examining how social contacts modify personal behavioral patterns. The three social influence mechanisms which involve conformity, recognition, and internalization demonstrate how people adopt new attitudes according to different social circumstances. The model lacks full explanations about how people resist social pressure alongside inadequate representation of power relations that exist between individuals and social groups. External factors that include institutional support together with policy enforcement demand examination because they determine the adoption of attitudes toward AT in special education settings.

Furthermore, the SIT model, which describes social pressure as a significant force for changing the individuals' opinions toward social issues, maintains that the degree of social impact depends on three major factors. According to the SIT,

how individuals react to social influence depends on the size of the group they are a part of, the power of the agent who influences the group, and the agent's immediate (or close) proximity to the individual (Davlembayeva & Papagiannidis, 2024), which will trickle down to give the individuals the required conformity toward adopting the practices for a change. This connects to AT in the ways that educator implementation is one of the most crucial pieces of utilizing AT; that is, if there is not buy-in to use the devices or service, then it may fail from the beginning, which of course would result in a negative outcome for the student.

Strength means that if a practice is supported by active social groups or a higher authority, it will gain momentum and give results. The factor of immediacy implies the more groups and individuals act in time and provide assistance and support to those who need it, the better the environment would be proper for implementation. Also, the availability of AT is another aspect of immediacy as the users would find it supportive and appropriate. The factor of number refers to the opportunities and times in which the users are able to get in touch with each other and continue to utilize AT tools. Furthermore, it has a strong, immediate, and numerous source impact on society (Ni, 2020). Additionally, continued use is as important because then there is less likelihood of AT abandonment (the act of adopted AT no longer being used although it is still needed). By applying both theories of SIT and the Theory of Attributes, special education leaders can provide data-driven results of their ideas to stakeholders, which will likely demonstrate a positive benefit for educating students with disabilities.

Additionally, for example, Social Influence Theory (SIT) explained how individuals in each environment might either hinder or otherwise enhance change. SIT relates to both disability and AT as it can explain their impact on humans as a group (e.g., group attitude or perception), not necessarily the device or specialized equipment, however, the social disability model (SDM) addresses all manifestations of disability exclusion, ranging from physical obstacles to societal attitudes and misconceptions about disability. Its main objective is the realization of handicapped people's human rights, and it plays a big role in disability legislation in many nations across the world, including Great Britain. Therefore, the socio-structural and psychological levels are included in the concept of disability (Nenadović et al., 2017).

SDM offers extensive coverage regarding disability inclusion because it focuses on resolving barriers that extend beyond the impact of social influence. In terms of human rights SDM presents a total view of disability obstacles yet SIT concentrates mostly on attitude modification. The design of AT policies requires specific approaches because both structural restrictions and societal perspectives need direct intervention.

Furthermore, for implementation to be successful, Roger's Theory of Attributes emphasizes the significance of change initiatives and the need for positive perceptions of AT. Furthermore, Rogers developed this model to demonstrate how inventions propagate. Over time, originality is passed on between the participants

in a social system via specific routes, a process known as the dissemination out of innovation. Additionally, it hinges on the demands of the user group as well as personal perspectives (Dibra, 2015).

The Theory of Attributes by Roger demonstrates the process by which social structures implement innovation adoption. The theory fails to provide adequate methods for handling psychological barriers towards change implementation. The implementation of AT depends equally on attributes of innovation and on readiness within both socio-cultural frameworks and institutional structures. Education professionals in special education must undergo specialized training along with continuous stakeholder meetings to defeat the resistance toward AT implementation.

Thus, the way those shape their perceptions is just as important as the social attitude. Though it might seem like a straightforward idea, in practice innovation and change are frequently met with opposition, and this can have a direct and detrimental effect on the AT user. Both theories serve as theoretical frameworks in this work to help understand the relationship between AT and disability in special education. To be more precise, the first element—called relative advantage—refers to the extent to which innovation is regarded as being more valuable than the idea, scheme, or product that it is meant to replace. The second factor is compatibility, or how well an idea fits the needs, experiences, and values of potential backers. The third aspect is complexity, which makes an innovation easier to use or understand even when it's really challenging. Friability, or the capacity to conduct tests or experiments before committing, is the fourth factor. The fifth aspect is observability, that is the innovations' and their outcomes' observability or tangibleness (Vikita, 2016).

While these five factors provide a structured approach to evaluating innovation adoption, they do not fully consider external influences such as financial constraints, policy support, and user accessibility. AT adoption in special education requires multi-layered strategies that integrate both technological and social aspects. Thus, a combination of Roger's framework with SIT can offer a more nuanced understanding of AT integration in learning environments.

Each of these factors can be used to provide guidance for change initiatives in education. Special education providers can organize and direct positive responses to change in a sometimes change-resistant environment. For example, the way in which an innovation is perceived by stakeholders will ultimately determine its success or failure. Therefore, the five factors of influence should be determined before implementation is underway so that "innovation adoption" will take place; an accepted scientific framework known as Rogers' diffusion of innovation provides a conceptualization of the procedure of innovation diffusion. This framework may also be extended to the processes of innovation adoption, particularly to the implementation of technology for learning in education. While numerous theoretical frameworks tackle innovation adoption, it is important to note that these frameworks conceptualize the elements that influence the innovation's use

or acceptability, but the primary emphasis of this discussion is on the innovation adoption process. This directly applies to AT (Frei-Landau et al., 2022).

For example, Rogers' theory states that the perception of an idea should be positive, therefore making AT a positive and pleasurable event. Compatibility is the degree to which the idea is consistent with currently existing values. Special education leaders should inform stakeholders that the new methods fall in line with best practices and the vision for all students; this can occur by stating the school and classroom values of diversity in AT for diverse learners. Complexity of implementation often limits its use. Stakeholders should be trained on how to implement new procedures by a team of specialists; however, the effective development and adoption of technologies is viewed by socio-technical reasoning as a protracted, multi-actor activity that depends on all stakeholders viewing the technology's use as having more benefits than drawbacks. It is not only a matter of functionality or accessibility (Ayon & Dillon, 2021).

2.3. Factors for the Successful Implementation of Assistive Technology in Education

The perceived outcomes, for example, of implementing AT to provide access for a learner who otherwise cannot achieve without AT should far outweigh its technical or procedural difficulty. Additionally, in the treatability factor, new ideas that can be adopted over time or on a trial basis are often better perceived by users. Therefore, for AT, trialing is required, so this introduction to the method before its date of final implementation can help teams and learners adapt to the process, and potentially be less stressful. There are three factors that enable children with disabilities to successfully participate in the general schooling curriculum. The "triangle of supports" consists of accommodations and adaptations, instructional and AT, and individual supports (Coleman & Cramer, 2015). In addition, how the innovation is perceived by other members of the system is positively related to its adoption and relates to the factor of observability. Selecting initial educator users that are eager to learn innovative and data driven ways to teach learners, such as learning specialized AT software (e.g., Boardmaker), may assist in decreasing barriers for others as they observe the success of early adopters of new AT. Lastly, the two factors of reinvention (products and techniques should be flexible to modifications or adaptations) and change agents (persons who influence the group) are practices and people that can greatly impact the implementation of AT in positive or negative ways. Educators' and providers' expertise and skills are critical to the successful integration of AT. Students with disabilities could benefit greatly from the growth of AT capacity among a variety of professional groups (Root-Elledge et al., 2018).

2.4. Challenges in Assistive Technology Adoption in Special Education

Research reveals various obstacles that prevent the use of assistive technology (AT) in special education classrooms. Educational AT adoption faces strong re-

sistance through insufficient teaching staff training along with specialist awareness about effective implementation. Kenyan pre-service teachers face challenges when using AT in adapted physical education because they lack proper AT proficiency and understanding even though existing AT facilities remain accessible (Esther & Kerich, 2025). The insufficient awareness about assistive technologies in Pakistan leads to reduced accessibility of assistive technology for children with special needs (Kamran & Bano, 2024).

Financial challenges along with logistical requirements as well as employee attitudes act as fundamental barriers to the adoption of AT technology. Prohibitive AT device prices together with delivery obstacles and educator and family reluctance create barriers for AT implementation according to Oyedokun (2024) and Gomes et al. (2024). The lack of standardized procedures at university disability units contributes to slow AT integration and decreases emergency support capabilities for students Macheque et al., 2024. A well-implemented assistive technology program depends on proper educator training while ensuring both school-family cooperation and better facilities based on autistic student enrollment challenges experienced in schools (Gomes et al., 2024). Enhanced educator training sessions together with inclusive policy development and partnership establishment will build a stable technological environment for AT deployment which provides all students with equal access to educational resources (Oyedokun, 2024) (Macheque et al., 2024).

3. Methodology

3.1. Research Design

A desk-based research design serves this study by analyzing existing literature together with policy documents and theoretical frameworks focusing on assistive technology (AT) in education. A literature-based approach proved suitable for this research because it allows synthesis of existing knowledge and policy analysis of AT policies between the United States and Saudi Arabia.

3.2. Data Collection Methods

The research utilized electronic database searches which identified relevant literature in Google Scholar, PubMed, and Scopus. The chosen keywords consisted of "assistive technology in education" along with "AT policies in the US and Saudi Arabia" before focusing on the "comparative analysis of AT policies". The article selection focused on peer-reviewed publications together with government reports and studies that dated from the past ten years to guarantee the inclusion of contemporary research materials from trusted sources.

3.3. Data Analysis Methods

A thematic analysis method was utilized to study the selected literature which concentrated on policy frameworks together with implementation challenges and theoretical models affecting AT adoption. The research performed a comparative

assessment between US and Saudi Arabian AT policies while analyzing their strengths and weaknesses and opportunities for enhanced policies.

3.4. Ethical Considerations

Since the research depends only on secondary data no ethical authorization is needed. A proper citation of all research materials was utilized to maintain academic ethics and research ethics compliance.

4. Selecting AT

Students with disabilities use various types of the AT continuum according to their specific disability. The continuum of assistive technologies can be classified as low tech (tools that are typically low cost and less complex) such as colored transparent overlays, pencil grip, slant board; mid tech (tools that are typically moderate cost and require more complex tasks such as the use of batteries or layers of problem solving). In addition to wheelchairs, hearing aids, glasses, pill organizers, and prosthetic limbs, assistive technologies also include communications and information technology, cognitive aids, specialized computer hardware and software, and personalized phones. Items that are necessary to preserve or enhance a person's functionality are referred to as prioritized assistive items, and they must be made obtainable at a cost that the community or state can pay (World Health Organization, 2019).

Any of the above assistive technological tools can help students by simplifying tasks such as turning on equipment, holding objects in place, improving visual and audio capabilities, and enabling participation in educational activities. For a student with a disability, the goal of assistive technology is to preserve, enhance, or expand functional abilities to ensure the student can engage, learn, and develop (Texas Education Agency, 2022).

These various AT devices are available in most schools to facilitate easy learning for the students with disabilities. They assist students with disabilities like these who are deaf or hard of hearing by enhancing better recognition and understanding of the various skills that they are taught. Also, students with disabilities depend a lot on various low-tech devices while performing their tasks and assignments, at home or school. Moreover, with the use of AT, students can engage in more social interactions, learn more, and potentially find fulfilling work. Additionally, it encourages students to take part in educational activities in the least restricted setting possible. With the use of assistive technology, students can access extracurricular activities at house, at school, and at work and profit from the general education curriculum (Center for Parent Information and Resources, 2024).

There are many frameworks used in selecting the appropriate AT for students with disabilities. These include SETT framework (student, environment, tasks, and tools); Wisconsin AT Initiative (WATI); and Quality indicators. These frameworks are briefly discussed in the following paragraphs. A common framework referred to as SETT (student, environment, tasks, and tools) plays a significant

role in guiding both the teachers and students to identify the authentic services and AT-devices that can appropriately support the children's learning experience. In addition, is intended to support cooperative teams in gathering and organizing data that will assist them make decisions regarding services that support students with disabilities in their academic endeavors (Zabala, 2020). The SETT framework is a vital tool for teachers, parents and the students with disabilities to make effective decisions since it offers students' shared interests and abilities to ensure that their needs are identified appropriately and to assign them the most suitable devices. It is also important to note that most teachers seek ideas from the SETT framework to collect information concerning students with disabilities within their settings and come up with the most suitable services and devices that will address a particular form of disability. The SETT framework also assists teachers to know the cost associated with adopting particular devices. The SETT framework report's analysis demonstrated the demand for AT that can give students independence when it comes to signing their names, creating logos, and finishing everyday art projects (Sweet et al., 2022).

The Wisconsin AT Initiative (WAT) is regarded as a significant resource offering information for parents and teachers concerning the AT devices that are appropriate depending on the student's level of disability. The WATI and Quality Indicators involves significant guidelines for assessment as well as evaluation of various forms of disability with checklists for teachers to use with children with disabilities to identify their individual needs and the suitable AT device to address each specific problem or disability. In this regard, WATI is a significant guide for special education teachers that helps school teams to assess and identify their student's needs. In addition, parents get paramount ideas from the WATI framework in terms of establishing their children's problems and needs and going for the suitable AT device to address the situation (UNICEF, 2022b).

Quality indicators include a cohort of various criteria that provide comprehensive information regarding the use and implementation of AT devices as well as the extent to which learners with disabilities make progress. These indicators help schools and service providers access the contemporary practices in the implementation of AT services as well as plans for improvement. Moreover, quality indicators provide parents with necessary information on their child's disability and a suitable AT device that can address that problem. This enables parents to choose the appropriate devices that address the challenges encountering their children with disabilities. Quality indicators also introduce several services and instructions that help the parents to be more informed on how to assess and select the most suitable AT devices that will address their children's needs as well as evaluate their progress (UNICEF, 2022a).

4.1. Using AT for Students with Disabilities

Recent developments in biometrics, mobile transportation, visual aids, and voice tools have all contributed to the advancement of technology and are expected to

increase the physiological capacity of individuals with one or more disabilities. These days, specialized education uses AT technologies such as computers, iPads, personal dictionaries, tablets, software, and specialized hardware such touch displays and modified keyboards. The choice of the most appropriate assistive technology, its use, and how to include it into regular classes and lesson plans can all have a direct bearing on the academic development of children with disabilities (Adebisi et al., 2015).

Therefore, suggestions from research studies have specified that policymakers and special education authorities in many developing countries need to update regulations and laws related to AT; this may promote access and most importantly, first set a foundation for valuing AT and students with disabilities. In this respect, authors in countries such as Saudi Arabia believe that following the example of United States would positively impact students with disabilities and special education services, however the Ministry of Education's Department of Special Education convened with experts and academics from colleges to examine all the country's special education laws, including IDEA, and develop new guidelines. The first Saudi Arabian legislation pertaining to disabled children were created in 2001 and are known as the legislation of Special Education Programs and Institutes (RSEPI) (Almalki, 2022). Studies investigating accessibility and adoption of AT in countries such as Canada, Australia and the US have recommended future studies to research the students who learn under different conditions and different countries. Therefore, the researcher provides comparison and parallels in how legislation in Saudi Arabia was originally based on the successful example of AT implementation in the US, including the influence of understandings of disability and decision-making. However, to begin positive change, attitudes must be addressed.

There are several ways in which special education policy and school leadership can promote and detract from understanding AT in schools. social environment has an impact on decision-making as well as on how individuals progress with developing personal attitudes and opinions toward social practices such as business and political support, also The theory contends, from a desire viewpoint, that the level of a person's social engagement can be beneficially affected by social connectedness due to the person's desire to feel associated with others and inversely affected by social distancing due to the person's need to experience a social line that separates them from others (Lim, 2022). This impacts people with disabilities because students who require AT may be dependent on implementation based on an educator's attitude or opinion or an organization's standpoint and beliefs both positive and negative.

AT supports and services must be based on students' needs as well as laws and best practices, rather than individual opinions or systematic organizational bias. Laws can be influenced by stakeholders such as educators, parents, AT users, and financial perspectives such as insurance company limitations. These stake-holders either promote value and understanding of disability as a neutral and natural part

of the human experience, or they detract positive efforts by minimizing the need for accessibility, which indicates the importance of starting from the work on changing organizational culture and attitudes of these involved in the educational process. Social ties and emotion expression have been among the aspects of change that research studies have highlighted. There is a recent inclination to consider disability as an equality and diversity perspective rather than in internal or solely individual problem and to utilize social networking and group ties in driving social impact and decision-making mechanisms (Bault et al., 2017).

Using the SIT model and Theory of Attributes as a framework for this paper extends an understanding of social influence on the adoption of assistive technology. Without such understanding, the many problems that students with disabilities encounter in their new educational environments might cause failure to special education programs of transition and inclusion. Hence, whether the student is new to AT or transitioning with an already established system or support, external influences of bias, negative conceptualization of disability, individual opinion, and cost rather than need, detract from the authentic understanding of disability and AT in schools. On the other hand, while assistive technology (ATs) can help students with disabilities overcome obstacles in areas like adaptive skills, learning, communication, leisure activities, and personal care, the lack of suitable teacher training programs and sufficient support underscores the shortage of qualified educators with the requisite knowledge and abilities (Şahin et al., 2023). Unless we gain and apply theoretical views of the obstacles that students with disabilities are experiencing, our interventions to assist them will lack positive impact.

To move forward AT would bridge the gap existing between academic success and failure of students with Disabilities who have historically failed in reading and writing without techno-logical support. Moreover, the integration of assistive technology into the learning process is critical to the success of children with disabilities in education through improving their basic skills and communication skills (Chary & Perumal, 2022). Perhaps, if we combine such evidence from research studies with theoretical understanding, the adoption of AT in special education would become more feasible and better achievable, thus promoting, rather than detracting from future efforts. Some practical ways to accomplish this include structure from experts in the field.

4.2. Evidenced-Based Practices to Implement AT

State that the unique learning challenges experienced by students with disabilities and the obstacles to comprehensive education include the disparity in opportunities for learning for those with disabilities, the research-practice divide, and the academic success gap between children without disabilities and those with impairments should urge the AT demand in the special educational environment to emphasize evidence-based practices (Zemba & Chipindi, 2020). AT empower students with disabilities as learning aids, compensates by providing interventions

and promotes self-reliance, self-sufficiency, and independence as well as It enables kids with special needs to grow into self-sufficient individuals and take part in educational activities alongside their classmates. To succeed in an inclusive classroom, children with special needs must have a range of specialized challenges addressed. Selecting the right assistive technology tool is essential to assisting children with impairments in the educational process (Viner et al., 2020).

In parallel, for students with impairments, assistive technology (AT) devices can foster an atmosphere that is conducive to their independence and skill development. According to them, research has demonstrated that when assistive technology (AT) is used effectively, young children with disabilities can overcome their shortcomings because the devices increase their strength and help them realize their full potential (Tamakloe & Agbenyega, 2017). The best practices and resources are discussed next.

As cited previously, both theories of SIT and the Theory of Attributes support that individuals in each environment can either facilitate use of AT or otherwise make it difficult for students with disabilities to survive their environment (Manchester et al., 2014). By utilizing established structure in the field of AT, such as the SETT framework for decision making, the WATI resource, and the QIAT indicators, teams can systematically determine their impact and work on specific AT improvements in effective design, development, and delivery of AT (QIAT Community, 2015).

There are other assessments specific to various areas of AT after the initial SETT framework helps a team establish a need. For example, Watson & Smith (2012) compared the Student Performance Profile (SPP) and the School Function Assessment Assistive Technology Supplement (SFA-AT) and found the SPP to be efficient and effective but with less potential and impact than the SFA-AT. Additional assessments can aid in identifying specific need and trialing of any device, for example, computers, hand-held tablets, smart phones, and audio devices, as well as disability-specific related devices, such as software for the blind or deaf. Technology and notably, AT, has an important history for people with disabilities and special education. Legislation has specified certain protections and access.

4.3. Comprehensive Education School

The concept of comprehensive education has its roots in the common school system in Scotland during the 17th century, but its current form originates in the United States. By the 1920s, the United States had reached its full potential. It provided the United States of America with a significant advantage in the post-World War II expansion of higher education, as the nation had a pool of educated individuals up to the age of eighteen who were eligible to enroll in their greatly expanded higher education system (Coryton, 2022).

The degree to which all children in a certain age group attend the same schools, regardless of their skills or social backgrounds, is referred to as comprehensiveness. Less student separation occurs through ability grouping, tracking, and par-

allel schooling in more complete educational systems. It makes reasonable to see comprehensiveness as a continuum, with the most comprehensive systems distinguishing late and little and the least comprehensive systems differing early and in various ways, because educational systems always discriminate among kids in some way. A well-rounded education that promotes academic success, personal development, and social harmony is the aim of comprehensive education, which guarantees that pupils from every background can realize their potential (Sass, 2022).

4.4. Comprehensive Education Schools in KSA

Through the provision of equitable opportunities and high-quality programming for all students in general education institutions, the Kingdom of Saudi Arabia has facilitated the implementation of a comprehensive education system. It has also made significant contributions to the design of the comprehensive education plan, which are demonstrated by the experiments it conducted prior to the implementation of universal education and by its collaboration with the University of Oregon in the United States of America to lay the groundwork for this project. In cooperation with the US Council for Disabled Children, it carried out its initial trial at two northern Riyadh schools in 2005-2006. Also, it has a 2016-2017 experience in 6 pilot schools in Riyadh as a step to equip general education schools to implement inclusive education (Al-Hakami et al., 2023).

However, a crucial component of the Kingdom of Saudi Arabia's Vision 2030 for Education is the inclusive education project. The vision placed a strong emphasis on raising the caliber of services and programs provided to various student populations. The Kingdom has also created inclusive education goals that are thorough, precise, and unambiguous. In order to support individuals who possess a well-defined plan for execution. As one of the most significant sources of peer-to-peer learning through utilizing one another's experiences, inclusive education aspires to completely transform the school environment and general education while achieving heterogeneity among students (Al-Shaharani, 2023).

In addition, the education policy of the Kingdom encompassed several pillars and viewpoints related to the field of special education, as well as measures that guarantee equitable learning chances for every student. These measures included the creation of regulations regarding the identification and categorization of students with special needs. Equal access to education that is both appropriate and fair for every student with disabilities in schools, regardless of their gender, social background, location, or special needs; support for gifted and special education programs that foster their creativity and talents; and awareness-raising, framework-building, and policy-making to incorporate pupils with physical and mental disabilities into the regular education curriculum (Al-Sufyani, 2021).

4.5. Impact of Legislation on Assistive Technology Implementation

In line with theoretical frameworks, strength and number of regulations is what

research regards as important factors for implementing and disseminating AT in education. Federal, state and local legislations and district practices have an impact on the decision-making procedures regarding use of assistive technology in Special education. Therefore, both accessibility and decision-making for assistive technology program implementations for students with disabilities in the public schools are affected positively or negatively by the social influence of regulations and laws. The term "child in need" was first used in the Children Act of 1989. It refers to a kid who is unlikely to meet or sustain an adequate level of growth or health without the assistance of the local government and is eligible for special compensation (Rossa, 2017).

Since then, the quantity of US laws has been a major factor in encouraging choices that support the learning environment for kids. The Smith-Fess Act of 1920, for instance, opened the door for government financing interventions for crippled rehabilitation that included Americans who have not served in the armed forces. The Berkeley, California-based Center for Independent Living (CIL) helped many pupils with physical limitations move from the colleges of health center wing to home living with attendant care services (Marini et al., 2017). In addition, for people identified as disabled before the age of 22, the Social Security Administration offered the Social Security Disabled Adult Child (SSDAC) program (Murahashi & Harrell, 2018). Nonetheless, the Education of All the Handicapped Act was passed in 1975, and as IDEA, it has undergone multiple amendments since then. To meet the demand for better implementation of special education programs. Moreover, support from social and community groups remains a real source of empowerment for special education so that AT is considered in every IEP annually (Fránquiz & Ortiz, 2016).

Practices of special education, which focused on providing equal education for students with disabilities, have been reinforced with federal and state laws, regulations, resources, and programs continued to be promoted and improved (Griffith, 2015). Using AT in special education has been considerably affected by support that came as a result to issuing of laws and regulations, as well as decision-makers' efforts. Within the U. S education system, an obvious example of these promotions and changes are the benefits that special education gained from legislations that reinforced rights to free and equal education. For example, when in the 1970s, the Education of the Handicapped Act was passed, special education professionals benefited from providing funds for training and emboldening of individuals with disabilities (Ross, 2022).

The history of legislative practice related to disabilities included many developments such as the Elementary and Secondary Act (ESEA) (Paul, 2016), The Individuals with Disabilities Education Act (IDEA) of 2004 (Yell et al., 2017), Every Student Succeeds Act (ESSA), signed in 2015 by President Obama (The Education Trust, 2016). Recently, a significant number of studies have indicated that educational-and-disability-related research has long tended to assist governments and practitioners in embracing the goals and objectives of special educational practices

(Fránquiz & Ortiz, 2016). For nearly a century, explaining phenomena related to disabilities has been used to highlight the relationships between enacting of laws and provisions for special education (Serpa, 2011). Furthermore, the No Child Left Behind (NCLB) act of 2001 has led to dramatic changes in public education for students with special needs (Hayes, 2015).

Legislation and regulatory guides have helped to define the scope of special education objectives and the tools that support the accomplishment of those objectives, specifically in the area of AT. In the US, the Individuals with Disabilities Education Act of 2004 (IDEA) allocated full decision-making authority for AT implementations as educational interventions for students with disabilities to the IEP administrators (University of the State of New York, 2017). On the other hand, many federal and state laws and regulations were blamed for deficiencies that posed threats and challenges to the practices of AT and services provided to serve students with disabilities. For example, the ESSA procedures were criticized for not addressing issues of inequalities regarding provisions among school districts and recently some AT is not compatible with statewide testing for learners with severe disabilities (Assistive Technology Act, Technical Assistance & Training Center, 2017).

Despite the advantages of federal, state, and local legislation as well as district practices, some of them have been described as lacking effective enactment. It seems that due to gaps in their procedures, some of the above-mentioned efforts failed to address some parts of school funding, practical logistics, or even students' social backgrounds, which have affected learning and achievement scores of some students with disabilities. Many developments came in the form of reauthorization of a former act or law to be amended to suit the progress of life skills cultural tools such as technology and infrastructures. For example, the Elementary and Secondary Education Act (ESEA) of 1965 was improved 50 years later, when Every Student Succeeds Act (ESSA) was signed to include protection for groups of students who are vulnerable and support their teachers to perform properly (Fránquiz & Ortiz, 2016).

On a similar level, social groups (such as parent groups, and consumers with disabilities, as well as educators) have valued the role of social influence and support from laws, regulations, provision of resources, and district practices in favor of students with disabilities. According to the SIT model, for a change to take place, there should be conformity to the practice by all the involved individuals. Also, social impact will be greater when the source of pressure has higher status or a closer relationship with the target, and when there are multiple sources of influence (Alouch, 2023). Thus, applying theoretical understanding to the use of AT in special education has brought to the surface an important connection between decision-making and understanding of disabilities in educational environments.

For a special education and school leadership, it is not only important to understand the relationships between the students' disability and the school envi-

ronment, but also to know what actions of support are needed concerning use of AT. From a historical perspective, public opinion, community involvement, and the advancement of theoretical knowledge have all helped to advance accessibility through AT. However, for interventions to be considered inclusive, they should therefore address both the individual level—such as medical rehabilitation—as well as the societal level. This includes providing the required support services, designing infrastructure with accessibility in mind, changing the way people view disabilities, and advocating for inclusive education and community awareness initiatives to reduce stigma (Ahmad, 2015).

Naturally, improvements of legal enactments were accompanied with the resulting momentum and advancements in special education practices for equality. Eventually, the concept of providing services to people with disabilities in special education benefited from efforts, which social and communal groups forwarded to support special education provisions and accessibility services and given the way having a kid with a disability affects the entire family, it is critical to tailor the services to suit the family's unique needs. This includes determining the objective or consequence of the program and what kinds of targeted support activities will have the greatest beneficial and detrimental impacts on the family and child (Nalevska, 2020). Although the US has made vast improvements, such that other countries have followed its lead in special education law (Battal, 2016), there are still calls and recommendations for sustainable improvement. Therefore, most improvement currently is needed in valuing diversity and equitable access.

4.6. The Way Forward

The promotion of understanding of AT between the instructor and students begins with enlightenment of how the tools will eliminate some of the barriers or demands of the educational program, although Teachers may use technology to assist their students' study and reach the highest standards of education thanks to the quick advancements in AT in education (Alsolami, 2022). Development of AT as a tool to provide access to tasks that students would not perform without the tool depends largely on the types of tools available, the knowledge of the team, the IEP development, and the implementation of legislation and funding associated with special education programs and the government ought to remove obstacles to participation in its accountability framework. This should involve going over the processes for individualized education programs (IEPs) to make sure that placement choices for kids who qualify under the IDEA are tailored to each person and compliant with LRE criteria (US Department of Health and Human Services, 2023). Obstacles to AT implementation in the IEP can be researched from inside and outside the education classroom.

Many studies urge for more collaboration between the government, stake-holders and consumers for improvements across all academic disciplines regarding AT (e.g. Alquraini, 2011; Davis, Barnard-Brak, & Arredondo, 2013; Serpa, 2011; Taylor & Ringlaben, 2012; Yell, 2012). As Mankoff et al. (2010) pointed out, solutions

for improvements to special education strategies are typically based upon existing social theories and models, which contain limitations within them, as described in the Theory of Attributes and SIT model; attitudes and social change are important factors that impacts AT and persons with disabilities in schools and beyond school life. Moreover, AT talks that surround the IEP to guarantee openness, cooperation, and uniformity. While required, parent-school cooperation over AT may not be regular. A conversation plan would help to record and organize that cooperation (Widley, 2018).

Funding for assistive technology typically comes from multiple sources, which may be sponsored by government subsidy programs, non-profits with educational interests, and philanthropy. However, the funding sources may not be sufficient to accommodate all the students in inclusive learning environments. Supportive community groups and public interest initiatives such as QIAT and WATI are critical to both short and long term, forward progress toward a deeper understanding of technology as a vehicle to help the disabled students (Carver et al., 2015). Nonetheless, special education has gained popularity in Saudi Arabia as a means of providing disabled kids with an affordable, well-respected, and efficient education. The delivery of special education programs has advanced significantly in Saudi Arabia during the past 50 years, according to the country's educational history.

The Ministry of Education has made sure that there is enough education and that teachers are competent to provide special education for kids who need it, working in conjunction with other Department of Education institutions. In accordance with international literature, laws and standards, and education programs, Saudi Arabia has produced important regulations pertaining to disabilities. It did not, however, advance inclusive education at the same rate as other countries, which was inconsistent with upholding its commitment to the world community. In conclusion, the Kingdom's educational vision can be realized for the upcoming generation via diligent labor. As every learner have an equal opportunity to an education in a comparable, non-isolated setting, the Ministry of Education, represented by the Education Development Company, is eager to incorporate students with special needs into all their classrooms in general education institutions (Alzaharani, 2023).

5. Conclusion

The use of assistive technology has become widely practiced due to the widespread flux of technology promoting universal accessibility. This works to confirm that practices of special education, which focus on providing equal education for students with disabilities, have been reinforced with federal and state laws, regulations, resources, and programs that have continued to be promote and improve the uses of assistive technology. This has further been helped with technological revolution that incorporates advancements in biometrics, mobile transport, visual tools, and voice tools, all of which are likely to expand the physiological

capacities of persons with one or multiple disabilities. These techniques coupled with improvements of legal enactments are essential in ensuring momentum and advancements in special education practices for equality.

This paper attempted to explore the importance of AT for students with disabilities by means of discussing AT-related regulations, practices and frameworks and identifying the factors promoting or detracting AT implementation in schools. To achieve this aim, after defining AT, theoretical models applied to AT were discussed. For the selection of proper AT for students with disability, the paper reviewed three key frameworks (these were, SETT framework; WATI; and Quality Indicators). In addition, the paper examined how AT would be used with students with disabilities and the best evidenced-based practices to implement AT considering reviewing relevant literature and the impact of legislation on assistive technology implementation to put a way forward.

6. Future Perspectives

In the author's Saudi Arabia context, further research is needed to investigate issues such as accommodation of general curriculum and collaborations to enhance inclusion (Battal, 2016). However, numerous faucets show the expansion of special education. Special education services now cover a wide range of non-traditional categories of exceptionality, including giftedness/talent, autism, and learning difficulties. In addition, placement options are shifting from the institution-only model to the continuum of service possibilities. Finally, unlike twenty years ago, when services were limited to large cities, they are now available in rural areas and small towns (Battal, 2016).

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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