Recommendations to Improve Education for Students with Autism through Distance Learning Strategies and Assistive Technologies during the COVID-19 Pandemic

Dr. Dalliah Alkhoui
College of Education
Taif University
Email: dalia.k@tu.edu.sa
Saudi Arabia

ABSTRACT

The COVID-19 pandemic has created new educational challenges and presented new opportunities for educators and students with learning disabilities, especially due to the increased awareness and focus on inclusive education. While extensive research has been done on effective strategies for teaching students with autism in an inclusive classroom environment, there is minimal research conducted on strategies for distance learning education for students with autism. This group is at a higher risk of being excluded from online education compared to their peers who have no learning difficulties. Recommended strategies for enhancing effective online education for students with autism include strategies for developing instructional materials. Another is collaborative engagements with all stakeholders to develop an understanding of each student's strengths and weaknesses. The other is the provision of teacher training and continuous professional development. Next up is developing strategies for creating effective home-based learning environments such as providing all the required infrastructure for online learning. Finally, are strategies for instructional delivery such as the use of effective assistive technologies such as Zoom, collaboration with caregivers, and ensuring the active engagement of the students during instruction delivery.

Introduction

The COVID-19 pandemic has created new educational challenges and presented new opportunities for educators and students with learning disabilities. There has been an increased awareness and focus on inclusive education, which seeks to provide educational equity to all individuals as a basic human right and an important instrument for promoting social justice and building more inclusive societies (Imaniah & Fitria, 2018). Educators have been forced to adapt their teaching strategies to ensure their health safety and that of their learners. The shift from face-to-face teaching to the online teaching modality created numerous issues for education professionals, including high levels of stress, emotional exhaustion, anxiety, and anguish. According to Espino-Díaz, Fernandez-Caminero, Hernandez-Lloret, Gonzalez-Gonzalez, and Alvarez-Castillo (2020), the difficulties faced by teachers in adapting to the new circumstances are attributed to the lack of professional training for teachers in online teaching, complex home learning environment, poor online teaching infrastructure, and information gap.

Teaching students with autism spectrum disorder (ASD) is even more challenging for educational professionals due to their special needs. The number of students with ASD has continued to increase in mainstream classrooms (Fleury et al., 2014). With the shift from face-to-face teaching to online teaching, students with autism, teachers, and parents or caretakers encounter new challenges requiring immediate attention. According to Kucharczyk et al. (2015), the central purpose of special education and transition services for students with disabilities is to equip them with postsecondary education and facilitate their acquisition of meaningful employment opportunities. This goal cannot be realized without effective teaching and learning strategies for students with disabilities. Students with autism have additional needs, other than academic ones, such as social and behavioral needs that need to be attended to as they influence their learnability. Thus, educational professionals and other stakeholders must provide education for students with disabilities, such as students with autism, to employ effective online teaching strategies. Many researchers have explored inclusive education strategies for students with autism in the classroom environment, but limited research has been done on the effective online teaching strategies for improving the education outcomes for this group of students. Students with disabilities are at a higher risk of being excluded from online education during the COVID-19 pandemic because of these students' many barriers (Huang, Tlili, Jemni, & Burgos, 2020). Failure to accommodate students with disabilities will fail to attend to the educational needs of all students equitably, and consequently, this will increase the school or university dropout rate of students with autism (Zhang et al., 2020). This paper presents a literature review of the available online teaching strategies and assistive technologies for students with ASD and provides recommendations for improving education for students with autism through distance learning strategies.

Understanding ASD and the Challenges Facing Students with ASD in Distance Learning

Autism spectrum disorder (ASD) is a common childhood neurological disorder that affects an individual's ability to communicate and socially interact with others. It influences challenging or repetitive behaviors and sometimes affects the individual's cognitive ability (Thwala, 2018; Murray, 2015). ASD is a spectrum disorder and has different effects on different individuals. The severity of autism affects thus varies with the individuals. ASD affects individuals from different socioeconomic,

ethnic, and racial backgrounds, but its prevalence among male individuals is significantly higher than that of females. According to Thwala (2018), one in sixty-eight new-born children in the U.S. have autism. While the actual cause of ASD is unknown, it is associated with genetic and age factors. Thus, it is expected that the number of students with autism will continue to increase, which calls for effective, innovative strategies for enhancing education for this group of students. In the same vein, Wong et al. (2015) pointed out that the increase in the prevalence of ASD has increased the demand for effective educational interventions and therapeutic services. The first step to achieving this objective is to understand the specific needs and challenges of students with autism.

The communicative, social, and cognitive impairments that characterize students with autism present unique challenges for their online learning and online teaching for the teachers (Gavaldá & Qinyi, 2012).

Students with autism have varying levels of intellectual capacities.

This phenomenon is a challenge because it demands individualized teaching and learning strategies. The development and delivery of instructional content for students with autism should be specially designed to match their intellectual abilities for teaching and learning to be effective and successful.

Students with autism have varying communicative and linguistic levels.

A student's ability to communicate through a language that their teachers can understand is integral to the delivery of instruction content and measurement of student achievements. Students with autism have different communication and language levels that may hinder the development and presentation of educational content through online teaching.

Behavioral challenges

Students with autism may have behavioral problems that make distance learning very challenging. The problems include infliction of self-harm, uncontrollable tantrums, and aggression. Educators have a challenge of controlling the home learning environment, which is key in monitoring students' behavior and making necessary adjustments in the teaching process whenever required.

Inflexibility in cognitive behavior.

Students with autism have inflexible cognitive behaviors, which means that they require adjustments in the instruction delivery and therapeutic aids to meet specific cognitive needs.

Differences in social development levels.

Individuals with autism have varying levels of social development. Educational strategies employed in online learning for students with autism should reflect each student's social development levels. This can be challenging for educational professionals. In addition to these challenges stemming from students' characteristics with autism, there is the challenge of creating a conducive learning environment. School environments enhance significant functions for students with ASD. According to Stenhoff, Pennington, and Tapp (2020), schools serve functions such as facilitating academic instruction delivery, development of communication and social skills, and access to specialized and evidence-based programming for students with autism. Schools that provide special education for students with autism provide high-quality and individualized programs that seek to promote repeated practice across environments, explicit instruction in a range of skill areas, environmental arrangements and necessary supports for independent performance of daily routines, and function-based treatment assessment and treatment of problem behavior (Pennington, Courtade, Ault, & Delano, 2016). The shift to the online teaching paradigm means that these essential functions cannot be established due to the differences in the home environment for students with disabilities. Teachers or instructors are not able to conduct direct assessments and treatment of problematic behaviors. They are also not able to effectively provide the required environmental arrangements and supports. Besides, student motivation to learn through online platforms may be minimal compared to learning in a physical school environment. This, in addition to issues such as anxiety, stress, and reduced learning time, may negatively affect the online education of students with autism (Mekonnen & Muluye, 2020). Also, home environments lack sufficient reinforcements for engagement in educational activities. Online instruction for students with ASD may also be limited to them as instructors may not be able to notice important response cues such as positional and physical prompts (Stenhoff, Pennington, & Tapp, 2020).

Nevertheless, distance learning provides some significant advantages to students with autism. While being in school has its social advantages, such as improving the social and communication skills development for students with autism, students with autism that have severe social challenges may be subjected to negative learning experiences by their peers. The consequences include being socially rejected, teased, and bullied. These experiences inhibit their learning and result in poor academic achievement and lack of motivation to attend school. For such students, distance learning offers significant academic development opportunities since they are in a more comfortable environment. Another advantage is that since the parents or caregivers better understand factors that may exacerbate the ASD characteristics of their children, they can provide a better environment than classrooms that are often crowded and noisy, and school environments that have high human traffic and many different rules to be followed (Murray, 2015). According to a study conducted by Marteney and Bernadowski (2016) on teachers' perceptions of the benefits of distance learning, education for students with special educational needs and distance learning offers benefits such as

facilitation of increased access to learning activities, enhanced student self-paced education, increased availability of individualized student support, increased student motivation, and improved academic performance.

Challenges Related to Teachers

Teachers play a pivotal role in distance learning for students with autism. In online instructional delivery, teachers are expected to design and develop online teaching materials, provide supportive learning materials, deliver instructional content online, monitor student progress, and help students in observed areas of difficulties. Rice, Pace, and Mellard (2016) established that effective distance-learning teachers should engage in various student progress monitoring strategies and early problem interventions, provide instructional strategies and other forms of support. Possible assistive mechanisms include individualized education programs (IEPs) for students with specialized educational needs, provide assistance to students in understanding presented vocabulary and other textual demands, extend opportunities for engagement between learners and development of general social skills, and advocate for the development of a curriculum that is appropriate for students with various exceptionalities. The biggest challenge teachers face in online teaching is developing specific teaching materials for each student with autism to meet their specific educational, cognitive, social, communication, and behavioral needs. Teachers, even those experienced in teaching students with autism, will be forced to spend more time preparing materials that are modified to meet each student's needs and in delivering the instruction content. Distance learning breaks the teacher's norm of delivering instructional content in a group context, in classrooms, where modifications to content delivery or adaptations are implemented in the moment of need. This strategy cannot be applicable in distance learning as the teacher has to attend to each student individually to realize the specific objectives or learning outcomes intended for that student (Stenhoff, Pennington, & Tapp, 2020).

Teacher training, attitudes, and support are important factors that influence online teaching. Many regular and special education teachers do not have any training on developing online instructional content and its delivery. Thus, the quick shift to distance learning methods of instruction delivery is challenging for teachers because they are not equipped with the knowledge and know-how for online education. According to Bjekiü, Obradoviü, Vuþetiüa, & Bojoviü (2014), distance learning demands a complex system of special roles and competencies from teachers that are more challenging compared to the more traditional teaching approaches that teachers are accustomed to in face-to-face teaching. Therefore, distance learning for students with autism requires overcoming the barrier of the lack of professional teacher training in developing and delivering online instruction content. Gavaldá and Qinyi (2012) asserted that programs developed for students with autism could only be successful if the teachers are provided continuous professional training to match the demands of the delivery of these programs. The lack of adequate programs for teacher preparation for online teaching is part of the barrier in teachers' professional training in online teaching (Crouse, Rice, & Mellard, 2018). Teachers' attitudes towards distance learning are another potential challenge to realizing effective delivery of online teaching strategies. According to Gavaldá and Qinyi (2012), teachers' attitudes influence student outcomes such as social behavior, self-image, and academic performance. Thus, spurring positive attitudes towards distance learning among teachers of students with autism is necessary to influence positive academic and social development outcomes.

Another challenge for teachers is that they have to transfer some part of their instructional delivery responsibility to caregivers and collaboratively work together to meet the desired goals. This can be a challenge for the teachers because the caregivers' availability to assist in instructional delivery may conflict with the teacher's availability due to the other responsibilities such as childcare and work. The caregiver must have enough knowledge and experience working with the student to ensure that any negative behavioral changes observed during instructional delivery receive immediate mediation to restore normalcy in the student's behavior (Stenhoff, Pennington, & Tapp, 2020). Moreover, teachers may face challenges in delivering distance learning education if they are also involved in other family-related activities such as teaching their children and tending to their children's emotional or medical needs. Poor collaboration between teachers and caregivers can be an acute problem in delivering distance learning education for students with autism.

Challenges Related to Caregivers

As pointed out above, the collaboration between teachers and caregivers is central to distance learning education for students with autism. Therefore, it is important to understand some of the challenges associated with caregivers that may inhibit established distance learning education strategies. Caregivers of students with autism are either their parents, siblings, close relatives or other guardians who often have other responsibilities. The shift from traditional face-to-face teaching to online teaching creates new unpredicted and unplanned responsibilities for the caregivers that they must squeeze in their schedules to facilitate education for autistic children. The additional responsibility may be a challenge due to the required effort and their already busy schedules due to other responsibilities such as working and attending to other family chores. Another challenge is that the caregivers may lack the knowledge and training required to provide the necessary support for students with autism. In school environments, these students are managed and supported by specially trained teachers who have extensive knowledge about ASD and how to recognize and respond to the needs of students with autism. Caregivers, however, may lack this knowledge and skills, which can be challenging for them to manage and support the students in home-based learning environments.

Caregivers have to manage learning time for the students and monitor them as they engage in online learning activities. The instructional strategies employed should be consistent with what the teachers have been using in schools, especially because they have developed routines that aid successful learning in the school environments. As much as possible, these routines should be established in home-based learning. Therefore, teachers should provide curricular materials and instructional procedures to the students' caregivers and family members. Furthermore, the caregivers must be engaged in problem-solving in observed challenging behavior or student failure to respond to the provided instruction procedure. Another challenge to the caregivers may be in creating a conducive learning environment within the homecare setting. Some students may be coming from low-income families and may not provide the required learning environment for their children and internet accessibility.

Accessibility to Distance Learning Education

In addition to the highlighted challenges, accessibility to online educational resources and online teaching is fundamental to the success of online education for students with autism. Online access requires network access devices such as laptops, desktop PCs, tablets, smartphones, high-quality internet access, and sufficient bandwidth. Students with autism who live in remote or rural areas that have poor internet connectivity or with caregivers who cannot afford internet services encounter the challenge of accessing online instruction content.

Guidelines and Strategies for Developing Distance Learning Strategies for Students with Autism

Developing distance learning strategies for students with autism involves careful planning of instructional programs and aligning the programs with evidence-based practices to maximize the students' outcomes. Stenhoff, Pennington, and Tapp (2020) established some important guidelines for developing home-based instructional programs and suitable strategies for delivering instructional content for students with autism. Different types of instructional materials and other support materials and tools are required to aid in the learning and development of students with ASD, including instructional materials such as adapted books and pictures or words for matching tasks, communication supports, organizational supports, and behavioral supports (Stenhoff, Pennington, & Tapp, 2020). Additionally, teachers should seek to understand the needs and supports required by the caregivers to ensure that they successfully aid them in access to the instructional materials and other student support. Caregivers should be provided with the necessary support in accessing the materials, printing required materials, ensuring that they have internet access, and using file-sharing applications.

Developing Instructional Materials

The instructional materials should be adapted to the needs of every individual student. This is especially because caregivers may not be able to make appropriate adjustments to meet their children's needs. In addition to this consideration, the teachers should also factor in prompting support required by each student to enable them to make meaningful interactions with the instructional materials and provide the appropriate feedback. That can be achieved through highlighting or using pointers or cursors to prompt student responses.

Communication Support Materials

Even with the development of the best instructional materials, distance learning can never be successful without effective communication of students' understanding of the content. Therefore, the students must have a method of communicating or demonstrating their understanding of the instructional content. Different forms of student response to instruction content should be identified and the effective response mechanisms adopted. This scenario can include utilizing communication service professionals, assistive technology tools, and augmentative and alternative communication (AAC) devices such as picture symbols and communication software installed in mobile devices. The caregivers should be provided with instructions and necessary support on the use of the communication tools.

Behavior Support Materials

Due to the change in their education routine from the school environment to the home-based learning environment, some students may exhibit problematic behavior and try to avoid learning. As such, behavior support materials should be established to help the caregivers manage students' problematic behavior and motivate them to engage in instruction learning content. The established behavior intervention plans (BIPs) that are included in the student's IEPs may not apply in the home-based learning setting. BIPs are established based on the school environment factors, which may be different from those in the home environment. Therefore, teachers should conduct functional behavior assessments of the students with the help of the caregivers and make necessary modifications to the BIPs. The established BIPs should indicate the identified problem behavior, circumstances under which it occurs, environmental modifications to minimize or prevent reoccurrence of the behavior, targeted replacement behaviors, teaching strategies and reinforcers for increasing the replacement behaviors, reactive strategies that should be employed if the behavior occurs, strategies for monitoring student progress and communicating the progress to the teachers and the families of the student (Cook, et al., 2012).

Delivering Instruction to Students with ASD

Instruction delivery for students with autism through distance learning education involves collaborative efforts between the teacher and caregiver. Therefore, the teachers and the caregivers should be prepared to effectively provide online instruction

delivery for students with autism.

Teacher-delivered Instruction

The lack of research-based guidance on the effective strategies for online instruction delivery for students with ASD has influenced the adoption and modification of evidence-based practices established through traditional face-to-face instruction delivery for distance learning. Teachers can utilize their traditional face-to-face teaching experiences as important assets for delivering education instruction for students with ASD online, by identifying and bridging the gaps between traditional classroom environments and virtual classroom environments (Crouse, Rice, & Mellard, 2018). Stenhoff, Pennington, and Tapp (2020) identified the essential features of online instruction that teachers must consider when preparing for instruction delivery. They include preparation of "instructional environment, selection of curricula, selection of a learning management system, active engagement and systematic prompting during instruction, and progress monitoring (p. 214)." The researchers also pointed out that instruction delivery should factor in home-based learning limitations such as caregiver responsibilities, technology access, and broadband internet.

Teachers should work closely with caregivers to identify a consistent location free from distractions and clear physical boundaries and technological supports for instruction. The location should be dedicated to school activities. Otherwise, there should be clear indications when space is used for such. Timers can be used to help the student understand time for different activities. Teachers should provide the schedule for each school session's instructional activities and review them with the student during the instructional delivery. Teachers are also expected to meet instructional curricula' objectives with minimum resources and within the shortest time possible. Home-based instructional environments demand certain strategies for delivering instructional curricula. These plans include prioritizing instruction to focus on a few sections of curricula areas, careful planning and distribution of skills or embedding some skills within other skill areas, and allocating instruction on some target areas to caregivers so that the teacher can focus on academic skills. Depending on the students and their caregivers' needs, the teachers can employ a mix of the three, two, or three of these strategies.

The choice of the LMS (learning management software) is another important consideration for teachers. There are two broad categories of instructional delivery methods, synchronous and asynchronous teaching methods. Synchronous instruction involves the teacher directing the student learning process. It involves direct instruction delivery through assistive technology tools such as WebEx, PowerPoint, Keynote, and Zoom. On the other hand, asynchronous instruction involves indirect instruction, where students self-direct themselves through the learning objectives by following instructions provided in the pre-recorded lessons that are developed using screen recorders such as Google+ Hangouts, CamStudio, and Screencast-O-Matic). For effective instruction delivery, a hybrid of synchronous and asynchronous instruction should be employed. Caregivers should also be guided on how to use LMS. To ensure the students are actively engaged throughout the instruction session, teachers can employ tools such as color-coded materials, picture cues, pointers, highlighted text, and enlarged cursors. Interactive software tools such as Boom Cards and Kahoot also help increase students' engagement with ASD in instruction activities. Additionally, systematic prompting strategies such as visual prompts should be used to help the students during instruction (Stenhoff, Pennington, & Tapp, 2020). The teachers must generate student progress data reports through caregivers' help to establish target areas that the students require help in and ensure that immediate support in these areas is provided.

Caregiver Instructional Support

Caregivers may be involved in one or more of the three supportive functions in instructional delivery for students with ASD, including providing training sessions, providing instructions, and ongoing coaching. For caregivers to be effective in providing instructional support, teachers must provide them with sufficient training on how they can support their children, including a description of the skills that the students are to be taught using by the caregivers, modeling of the skills, engaging the caregivers in practical implementations, and providing feedback on caregiver practice to facilitate effective instruction delivery by the caregivers (Stenhoff, Pennington, & Tapp, 2020).

Recommendations for Improving Education for Students with Autism

The COVID-19 pandemic has necessitated a shift from the face-to-face educational system to a digital learning education system. Distance learning education system promotes the educational outcomes of students with ASD because it encourages the development of more individualized education programs, reduces social pressure encountered in traditional school settings, and allows the students to learn in a familiar and comfortable environment (Huang, Tlili, Jemni, & Burgos, 2020). However, the lack of ICT infrastructure, poor or lack of internet access, and lack of skills and educational resources (Mekonnen & Muluye, 2020) required for distance learning education present key challenges for implementing online teaching for students with ASD.

Therefore, there is a need to establish effective distance learning strategies and assistive technologies that can be useful in improving the educational outcomes of students with autism while navigating the barriers to their implementation. Based on the current literature analysis, the following recommendations for improving education for students with ASD are identified:

Strategies for Developing Instructional Materials

One of the key sources of information input in planning for student education is the students' abilities and strengths. As pointed out by Sawchuk (2019), inclusive strategies employed by educators for students with autism should aim at providing "education that enables them to feel accepted and valued for who they are (p. 12)." A concrete inclusive education plan for students with autism can be attained by collaborative engagements with all stakeholders to create a student profile that develops an understanding of the students' strengths and weaknesses (Brodzeller, Ottley, Jung, & Coogle, 2018). With online education, however, the needs of the caregivers should also be considered in developing instructional materials for students with autism. Individualized educational plans for each student must be established. The curricula, instruction support materials, instruction schedules, and the specific goals for each school session should be developed and provided to the caregivers. The instructional materials' linguistic characteristics are also of great importance when developing the instructional materials for students with ASD (Rice M. F., 2017). The language should meet the language level of the students.

The development of instructional materials should also factor in the ways of engaging students during instruction delivery. Teachers should devise ways of engaging students to ensure that they remain attentive and provide feedback on their understanding. The key areas that the students may require prompting support in the instruction materials should be marked out using strategies such as color-coding, text highlighting, and picture cards. According to Hayes (2013), prompting is an effective strategy for enhancing communication and language development for students with ASD. Understanding each student's strengths and needs is required to determine the appropriate level of prompting to be employed. Further, the researcher emphasized that continued evaluations should be conducted to determine the suitability of promptings to particular situations and establish how these promptings can be faded to avoid overdependence on them and encourage independence.

The strategies used in developing instructional materials are heavily reliant on the teachers' skills and know-how in providing distance learning education to students with special educational needs. As established in the literature review, general education and special education teachers do not have the required training and skills in providing online education for students with autism (Brock, Huber, Carter, Juarez, & Warren, 2014; Wei & Yasin, 2017; Coblentz, 2017). Providing teacher training, continuous professional development, and implementations of instructional content for students with ASD are ways to support students with ASD. So is the use of general and assistive technologies to provide educational support for students with ASD (Denning & Moody, 2013; Kucharczyk et al., 2015; Crouse, Rice, & Mellard, 2018).

Strategies for Creating Effective Distance Learning Educational Environments

The educational learning environments have a significant influence on the academic development of students with autism. While home-based learning environments are familiar and comfortable for students with ASD, this environment needs to be transformed into an environment suitable for distance learning. A study conducted by Manti, Scholte, and Berckelaer-Onnes (2013), established that a structured learning environment had a significant influence on academic attainment for students with ASD by facilitating minimized disruptive behaviors, anxiety, and confusion. The home-based learning environments should be appropriately structured to create a safe learning environment that increases student attention and academic achievements. This can be achieved by working closely with the caregivers by creating learning spaces with all the required infrastructure and supportive learning tools, and one that is free from distractions (Sulaimani & Gut, 2019).

Strategies and Assistive Technologies for Instructional Delivery

Collaboration between teachers and caregivers is essential for effective instructional delivery for students with ASD in home-based learning environments. This assumption is because teachers are unable to provide some instructions that demand physical assessments. Instructional times must be established before starting the school sessions as the teachers and caregivers have other home activities that must be considered. Instructional schedules and routines should be established to create a defined structure for the students. Another strategy for instructional delivery is for teachers to adopt evidence-based experiences from face-to-face traditional learning settings for online delivery. Teachers should also modify the established IEP instruction curricula to meet the students' programming needs during instructional learning sessions. A hybrid of synchronous and asynchronous instruction to ensure efficiency in instruction delivery is another recommended strategy for the online delivery of educational content for students with autism (Stenhoff, Pennington, & Tapp, 2020). Throughout instructional delivery, effective strategies for actively engaging the students in the learning, such as using color-coded materials, highlighted text, picture cues, pointers, and enlarged cursors, are encouraged. Another important strategy in instructional delivery is providing adequate training and continued support for caregivers, including teaching them the skills they need to teach their children, model and practically teach these skills, and provide feedback on caregiver instruction delivery.

Assistive technologies are useful in delivering instructional content for students with autism as they facilitate differentiated instructions (Lourenco, Goncalves, & Elias, 2015). Students with autism have communication and language difficulties and assistive technologies such as text-to-speech assistive tools that help read print content. Synchronous instructional delivery can utilize assistive conferencing tools such as Zoom and WEBEX, which have screen sharing capabilities. Assistive technologies that aid in engaging the students during instructional delivery include Boom Cards, Zeetings, and Kahoot. Assistive technologies help

students with social and communication challenges as they help the students' social and academic development. Organizational Apps such as Able AAC helps students with ASD to develop self-management and organizational skills. Augmentative and alternative communication (AAC) device is another important assistive technology for students with autism due to their language deficits. AAC devices can help both teachers and students to make meaningful communications. Social skills programs such as Aiko & Egor can help develop motor and social development skills for students with ASD.

Summary

During this period of the COVID-19 pandemic, educators need to shift to distance learning education or employ a hybrid of both face-to-face teaching and online teaching for their students. In the spirit of enhancing inclusive education for all students, educators need to develop effective strategies for teaching students with autism through distance learning. The lack of teacher training in curriculum development and online delivery of educational instruction for students with autism is specifically challenging in this period where online instruction delivery is required (Coblentz, 2017). This research paper explores current research studies and develops recommendations for improving education for students with autism through distance learning strategies and assistive technologies. Some key challenges for implementing distance learning for students with autism were noted, including lack of ICT technology, poor internet access, lack of teacher and caregiver training, social, communicative, and behavioral challenges that characterize students with autism. Nevertheless, distance learning offers immense opportunities for improving educational outcomes for students with autism, such as more individualized instruction programs, lack of social pressure, and being in a more comfortable learning environment (Sulaimani & Gut, 2019).

The developed recommendations for improving education for students with autism include developing instructional materials, creating an effective home-based learning environment, and instructional delivery. Some of the strategies identified include providing training and ongoing professional development for teachers, focusing on the students' individual needs and strengths in designing instructional materials, facilitating caregiver support through their education, and providing necessary support in developing an online learning space for the students. The assistive technologies that can be used to improve the students' educational outcomes include video conferencing platforms such as Zoom, social development programs, and Augmentative and alternative communication (AAC) devices to aid in communication.

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