

9-2017

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Recommended Citation

Scott, Laura (2017) "Use of Technology for Children with Autism: Academic Success in the Least Restrictive Environment," *Journal of Educational Leadership in Action*: Vol. 5 : Iss. 1 , Article 5.
Available at: <https://digitalcommons.lindenwood.edu/ela/vol5/iss1/5>

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USE OF TECHNOLOGY FOR CHILDREN WITH AUTISM: ACADEMIC SUCCESS IN THE LEAST RESTRICTIVE ENVIRONMENT

Faculty Article by Laura Scott

Abstract

Autism Spectrum Disorders (ASD) is a prevailing neurodevelopmental disorder that affects many aspects of a child's life. Their communication and emotional regulation are hindered which makes it more challenging for them to thrive in the general education setting. Every child has the right to be educated in the least restrictive environment with needed support provided by its local school. Research has shown the use of technology to be a major contribution to student engagement and success. The focus of this article is to examine how a child's communication and emotional regulation affect their academics and offer research based solutions. It is important for educators and family members to increase their knowledge of the latest interventions for speech impairments, social stories, and emotional regulation. Educators especially must remain current in these interventions and technology in order to see all students reach their full potential.

Introduction

Imagine being in a foreign country and not understanding the people around you. Now imagine that you need help or are feeling something but cannot communicate it to others. Strangers begin to judge you because you are unlike them and act "funny." This is similar to how an individual with autism feels among his or her peers. More and more children are feeling this way every day. Autism Spectrum Disorder (ASD) diagnoses are currently on the rise among hundreds of children throughout the U.S. Children who receive a diagnosis of ASD face daily challenges due to this neurodevelopmental disorder. They have difficulty expressing their needs or wants with others in an appropriate way. They are not able to understand common social rules of conversations and building relationships with others. An additional characteristic of autism is the difficulty with emotional regulation. They struggle with recognizing their emotions and being able to control them, especially when their environment has become overwhelming to them. With each of these challenges, it

seems almost impossible for them to be able to learn alongside general education peers in a school setting.

The Individuals with Disabilities Education Act (IDEA) protects students with disabilities when it comes to the educational rights of the child. This federal law requires that a child with a disability has the right to be educated among non-disabled peers in the least restrictive environment. They are not to be treated as outcasts and confined to secluded areas. They are to be given the same opportunities as the other students to show much potential they have. As an educator, one must be equipped to help these children learn and grow throughout the school year as they would for any other student.

Today's teachers face the challenges of understanding and teaching the increased population of students diagnosed with autism. Along with compassion, one of the most effective teaching tools an educator has is technology. Technology advances have provided a new avenue for advancement in the education world for the better, especially in the area of autism. Visual schedules are now able to be created digitally and mobile on a student's device. They allow the child's environment to be more structured by telling the student the order in which events will occur. Social stories can be recorded and customized to meet the exact needs of a child. Apps have been specifically designed to meet the needs of children in communication, socialization, and emotional regulation. This article will provide an overview of how these characteristics affect children with autism in the school setting and how to use technology support to enhance academic success.

Communication Difficulties

Children with autism spectrum disorder face difficulties with communication. The spectrum offers a range of children from those who are non-verbal to those who are able to speak but use incorrect sequencing or syntax. These struggles contribute to the lack of socialization in group setting. Some are completely unable to communicate with peers while others struggle in various areas such as initiating conversation, maintaining eye contact, sharing interests, etc. It is crucial that we find effective ways to assist these individuals in making strides with communication using the latest interventions that have proven to be effective. These interventions combine researched based strategies and educational technology.

A 2014 study involving three preschool and two elementary children with autism combined both the Picture Exchange Communication System (PECS) and an iPad (Hill & Flores, 2014). The purpose of PECS is to act as an alternative form of communication by showing various images for needs, wants, etc. The iPad enhanced the intervention by being able to contribute text to speech apps and an endless variety of pictures and vocabulary words (Hill & Flores, 2014). The results showed that while the PECS process should first be taught and practiced, technology helped make the intervention more effective. The children's communication increased. "Jackie requested marshmallows using full sentences on the iPad" (Hill & Flores, 2014, p. 52) which she was not able to do prior. "Kent appeared to independently request (for

snacks) using the iPad” (Hill & Flores, 2014, p. 52). In my experience as a general education teacher, I have observed students considered defiant because of their difficulty to process and express language. General education teachers who do not receive adequate training on how to work with special education students become frustrated with these students. Those who are able to use iPads to communicate have made amazing strides and it shows in the classroom. Their iPad acts as the main connection between them and with whom they are trying to communicate. They are able to quickly show images of what they need or where they want to go. They can put text into speech to help explain something to a teacher or classmate. It is clear that technology helps minimize the communication gap for students with autism.

Another intervention to help with communication is social stories presented through video modeling. A 2008 research study conducted by Sansosti and Powell-Smith supports the notion of using technology to enhance the learning of children with autism. Three children diagnosed with ASD (Autism Spectrum Disorder) were taught how to communicate in social settings using video modeling and computer assisted instruction. “When compared to their peers, all three participants’ rates of behavior were equivalent to or approaching the same level of their peers, which demonstrates the clinical significance of the interventions” (Sansosti & Powell-Smith, 2008, p. 173). The use of technology allows for greater student achievement. In my students’ educational setting, the speech language pathologist uses social stories presented through video modeling on a Smartboard. The videos involve either themselves or peers at school, which makes the lesson more authentic and personal. Seeing children act out social skills through video makes it easier for struggling students to imitate. Each social story can also be easily tailored to fit the individual child such as adding their favorite song or using favorable colors. All students in general like learning from technology because they see it being used every day and is engaging. Technology allows students to be creative while having endless possibilities at their fingertips. Teachers are finding that technology based interventions are making a difference such as with the social stories, “the computer-based interventions demonstrated adequate treatment integrity and were rated as highly acceptable by teachers” (Sansosti & Powell-Smith, 2008).

Children with autism would greatly benefit from technology-based interventions to help them build relationships with peers. Because their “spoken language development is often delayed” (Lowth, 2014, p. 20), using iPads have been proven to increase communication. Troubles with communication then lead into a lack of social awareness. I see this many times throughout my school day as a sixth grade general education teacher. Students with autism are not able to feel comfortable around their peers and become stressed. They do not understand how to initiate conversations, maintain eye contact, share interests, etc. The need for practical interventions is crucial. Lowth (2014) also said these techniques “of educational, social and communicative approaches (should be) tailored to the individual child” (p. 21). Technology makes the process of individualizing instruction much easier and less time consuming for educators. This helps children with autism receive a meaningful and effective experience.

In conclusion, communication is a main focus with autism spectrum disorders. It is vital for educators to stay up to date on the most useful interventions and best approaches for delivery. Technology allows multiple ways to improve social communication for children beginning in preschool throughout adolescence. This is why technology resources must be included in the education of children with autism.

Emotional Regulation Difficulties

One of the main components of autism spectrum disorders is the difficulty with emotional regulation. This is part of the neurological disorders that affects many children. They struggle to maintain a sense of internal balance because they are constantly trying to process and understand the world around them. It is very easy for these individuals to feel completely unstable and unable to control their emotions. These struggles lead to failure to form and foster relationships with peers. Not being able to filter through their mental chaos also affects their ability to learn. Interventions to help children process their emotions must be found to help our children be successful both socially and academically in a school setting.

A 2009 study conducted by researchers involving 29 children with autism sought to find a correlation between their restricted and repetitive behaviors and sensory abnormalities (Chen, Rodgers, & McConachie, 2009). The study found children with this disorder show “hypo responsiveness to visual stimuli, or hyper responsiveness to sound, and the presence of restricted and repetitive behaviors” (Chen et al., 2009, p. 636). Children with autism can become easily overwhelmed or agitated to light settings that typical peers find normal. Little sounds that the general education student is able to filter out such as a clock ticking or pencil tapping does not bother them while it can overwhelm a child with autism. In turn, the child has created some sort of repetitive or restricted behavior to cope. The study found “a significant relationship between the presence of sensory abnormalities and restricted and repetitive behaviors” (Chen et al., 2009, p. 639). These behaviors are not socially acceptable in our world. In my sixth grade classroom, I have observed the students with autism covering their ears, reporting migraines and asking for breaks. My classroom is themed to have calming colors of light blues and tans along with string lights and lamps instead of using the ones overhead. While this helps all of my students, they are only in my room for two hours a day. Other teachers do not provide the same accommodations I do. I can see the difference when students with autism come into my room from the hallway or another classroom that had all of the lights on and was very noisy. It is hard for them to calm down and focus on learning during the first 10 minutes of my class, which is crucial because we only have a small amount of time each day. These children are displaying their repetitive behaviors such as flapping, jumping, etc. As a result, their peers begin to reject them because they are distracting. Both of their learning times are minimized and relationships are not fostered. Therefore, interventions need to be put into place to help these children who cannot fully process the environment around them.

Another complication that affects children with autism in the school setting is their inability to understand and take into consideration other’s perspectives. A 2014 article

published by DeBarnardis, Hayes, and Fryling explained this struggle, “they cannot distinguish how their views, thoughts, and beliefs may be different from those of others” (p. 123). Many studies have been done to support this claim, and find the children with autism significantly behind their peers in perspective taking (DeBardnardis et al., 2014). This is also called a lack of theory of mind. Those with autism are unable to recognize that not everyone shares their views and interests. They do not make the connection that each individual is different and has grown from their own life experiences. My students with autism are not able to recognize other peers’ hobbies in order to establish and maintain conversations. They do not show interest in others’ likes or dislikes. One student, Lenny*, has made himself undesirable by his peers because he overtakes every conversation with his favorite topic of traffic lights. His conversations with peers are completely one sided, and he does not notice that his peers do not consider him a friend. Lenny is one of many children with autism who need effective interventions to help understand social communication.

Children with autism suffer socially because of their inability to emotionally regulate themselves and see others’ perspectives. They are made to be outcasts at school. A 2011 study conducted by Kasari, Locke, Gulsrud, and Rotheram sought to examine 60 high functioning children with autism and 815 of their typically developing peers (p.535). The purpose was to analyze each child’s social network status by interviewing them and comparing their answers to peers. Questions asked were, “Are there kids in your class who like to hang out together? Who are they? Who are your top 3 friends in class?” (p. 537). This let researchers know if friendships were being reciprocated to those with autism and if these children understood the social statuses in the same way as their peers (Kasari et al., 2011). Analysts then calculated each child’s score of being mentioned and if their friendships were reciprocated in their peers’ answers. A score of 0 indicated social isolation, 1 indicated peripheral meaning on the outskirts, 2 was secondary meaning well connected, and 3 was nuclear which meant highly regarded and popular (Kasari et al., 2011). As for those with autism, “8 children were isolated, 25 had peripheral status, 22 had secondary status, and five had nuclear social status” (p. 538). It is clear that children with autism struggle with forming and maintaining reciprocal friendships with peers. This is a large component of a child’s school experience, which supports the argument for needed interventions.

Educators must stay up to date on the most recent and effective ways to help children be successful in the school setting. Technology allows professionals to individualize interventions for these students based on sensory needs and perspective taking deficits. It provides multiple ways to help with emotional regulation, which will increase the student’s possibilities for success in the school setting.

Incorporating Technology

Engagement is a key requirement in educating all children. If the students are not engaged, the lesson will not be meaningful to them. Students with disabilities of any kind will not gain knowledge if a lesson is too tedious and not designed to meet the specific needs of that child. Using technology is an effective way for teachers to keep

all learners involved and to individualize specific lessons for students. Technology can be used for both whole group instruction as well as small group or individual learning. It helps children with autism be successful in the general education setting.

One way for teachers to enhance the learning of their students is by changing the learning culture with interactive whiteboards. This device takes the place of chalkboards or whiteboards used for whole group instruction. Interactive whiteboards are touch screen devices that allow the board to be both manipulated by students and customized by teachers to reach all learning styles. Students enjoy the variety that technology provides and have increased motivation when using such engaging devices. According to *Management in Education*, “the total experience of pupils does appear to be changing in several ways when teachers have developed competence in teaching with the interactive whiteboard” (Glover & Miller, 2007, p. 23). We cannot expect our students to reach their highest potential by remaining in their seats and filling out worksheet after worksheet. Whiteboards help teachers “present the same material in different ways to ensure understanding according to pupil learning style preferences” (Glover & Miller, 2007, p. 23). Children with autism need information presented visually through pictures, videos, and color coding. They also benefit from auditory stimulations such as upbeat noises or music. These characteristics can all be obtained through an interactive whiteboard.

For small group instruction, tablet computers (also known as iPads) have also been linked to student success in special education. A 2013 study conducted by Johnson supported the use of technology to enhance learning for students with autism. Twelve special education teachers and teaching assistants participated in a survey that sought to determine if tablet computers were appropriate for children with special needs (Johnson, 2013). They found that “tablet computers appear to have the potential to be an essential aspect of individual program plans” (p. 1). Teachers reported the various advantages of using tablets to facilitate learning. “For example, one teacher reported using the iPad for students to listen to music or auditory directions, which may facilitate the auditory processing of information and lead to improved listening skills” (Johnson, 2013, p. 5). Improved listening skills will help these students learn to communicate effectively. I also have students who use the iPad to communicate their wants and needs. This device can store thousands of vocabulary words and images to help each child get their message across. Because the iPad is portable, students are given the opportunity to learn in a comfortable and safe spot in the room. This helps my students to become relaxed in the learning process, which allows for student growth. “iPads can extend lessons when the child’s attention is at its end. Some students can relax and show their full potential when using the iPad” (Johnson, 2013, p. 6). Lastly, “enhanced student motivation was the most frequently reported benefit of using tablet computers in school followed by instructional planning advantages” (Johnson, 2013, p. 1). If students are given engaging tools that are centered on their needs, then the classroom is student-based and thriving. Many students will not think of this as an educational task, rather a fun activity. One teacher responded, “All of our students love the opportunity to use the iPads. They feel as though they are being rewarded” (Johnson, 2013, p. 5).

Along with enhancing and customizing the learning experience for students with autism, assistive technology also helps them be successful in the general education setting. Students with autism have the right to be included with their peers and given tools to do so. This gives them opportunities to exercise appropriate communication skills and learn beside those without disabilities. A 2007 study sought to determine which instructional approach was effective for students with disabilities, one-to-one embedded instruction implemented in general education classes or one-to-one massed trials instruction in a special education classroom (Jameson, McDonnell, Johnson, Riesen, & Polychronis, 2007). “The data shows that embedded instruction is an effective instructional strategy for students with developmental disabilities being served in general education settings” (Jameson et al., 2007, p. 39). This means that by giving children with autism the appropriate technology, they can be successful alongside their nondisabled peers. I see this in my sixth grade general education class as well. The devices assist the students with autism so that they do not have to leave the general education setting. For example, one of my students uses his iPad as his main form of communication. This gives him the opportunity to function in our class and not be permitted to a special education classroom. His academic abilities are not being hindered by the fact that he struggles with speech and language. Instead, he is given a tool to help him be successful in the least restrictive environment. A couple other students in my classroom use their iPad for emotional regulation or sensory breaks. There are specific apps that provide calming images and sounds when these students become overstimulated. They can simply find the app on their device and use earphones without being singled out by having to leave the room. They are receiving what they need in the general education setting.

To summarize, the use of technology allows students with autism to receive engaging and customized lessons. It also provides various tools to assist with communication, emotional regulation, sensory needs, etc. Educators use these devices to create student-centered classrooms in which these children can learn in the least restrictive environment while also having individual needs met.

Autism Specific Technology Available

Our world is continuously making advances in technology to help educators in our daily lives. New apps are being created on a daily basis to help people function such as task managers, roadmaps, alarm systems, etc. These apps are not seen as accommodations, but rather universal tools to help our lives stay structured and functioning more effectively. Because of this revolution in technology, apps are now available to help children on the autism spectrum. Apps have been created to help in the classroom. These apps focus on communication, social stories and emotional regulation.

Many children with autism struggle to communicate their thoughts and feelings. They may have speech impairments or be nonverbal. Luckily, there are now more options to assist these students rather than only sign language or picture communication

systems. Schectman (2015) researched and put together a list of the highest ranking assistive communication apps that can be downloaded through the Apple store.

One of the most popular apps is iCommunicate which can be downloaded on the iPad and serves as an augmentative alternative communication (AAC) device. This app is used by many teachers in schools today. The app comes preloaded with 10,000 images to help children with autism express their needs and wants (Schectman, 2015). Another feature that both parents and educators like is that the app can record audio in any language to use the voice of the child or a loved one (Schectman, 2015). Daily life is much easier with iCommunicate because it “allows you (the teacher) to create pictures, flashcards, storyboards, routines, visual schedules and record custom audio in any language” (Schectman, 2015, p. 1). It contains multiple resources for students with autism in just one device and can be customized to meet individual needs. For example, I have a student who has trouble verbalizing his comments or questions in class. He will try to speak but the words will be at a very low whisper and his eye contact is poor. We could record his voice in a setting where he is most comfortable and use the recordings in class to help him become used to using his voice in front of peers. He would also greatly benefit from a visual schedule to help him navigate through all of the various classroom routines in middle school. It would be much easier for him and his teachers to be able to upload their class routines with actual images from each room. iCommunicate can help students with autism in various ways.

As a general education teacher in the middle school setting, I see students with autism struggle daily with peer interaction and building relationships. Children with autism each have such unique interests and skills, it can be overwhelming for educators and parents to find social stories that can be meaningful for each individual child. Luckily apps have been made that allow for quick, easy and customized social lessons to be created.

An app called Book Creator allows users to “model situations by uploading sequenced pictures of a social story” (Csillag, Says, & Says, 2016). With this app, teachers can upload actual pictures from the child’s classroom or other surroundings. For example, entering the cafeteria for the first time can be very overwhelming. Prior to going to the cafeteria, I can sit with the student in my classroom and show the exact place and process they will follow in the comfort of our own classroom before heading to lunch. This app has the added ability to use their classmates in the social story to model what appropriate lunch etiquette looks like and how to start conversations. One student, John*, struggles with turn taking in gym class. John can get extremely overwhelmed which leads to a rising frustration level and inappropriate behavior. With this app, his gym teachers can pull up the customized social stories to be used as a model for gym class that his special education teacher created by using actual video of John* displaying appropriate behaviors in gym. Parents can also view the social stories we have worked on at school and practice the same ones with their child at home. The Book Creator app can also act as a journal for students with autism to help them retell stories or personal experiences (Csillag et al., 2016). This app supports my English Language Arts class by sharing what we have been reading outside of school or what

happened over the weekend. Students with autism who struggle to speak in front of their peers can use this assistive technology to help retell experiences to the class without feeling overwhelmed or unprepared. Book Creator serves many purposes to help children with autism thrive in both social and academic situations.

Many students with autism struggle with their academics when they are unable to emotionally regulate themselves. Students experience increased frustrations, which results in poor classroom behavior and low academic achievement.

An app for school aged children would be The Middle School Confidential. It is a “graphic novel sequence focused on making stepping stones out of stumbling blocks on the road to becoming a teenager” (Schechtman, 2015). The children follow a group of middle school aged friends sorting through the challenges of changing friendships, managing home life and balancing school (2015). The characters act as role models to the users as they face daily struggles that those with autism would also experience. The experiences cover socialization such as making new friends to academic struggles like time management and stress.

Another app that I use in my classroom frequently is GoNoodle. This resource is focused on getting students out of their seat for short brain breaks and moving around the room. “Studies have shown that physical activity increases blood flow, which increases concentration and attentiveness,” just as I have seen with my students (Schechtman, 2015). They enjoy the upbeat music and fun visuals of GoNoodle. I am able to choose from premade brain breaks or create my own interactive breaks using class material. It makes our classroom environment much more interesting and fun, especially for special education students.

As technology is becoming an effective instructional tool, it should be used to assist our students to best of its ability. With the increasing number of apps, there are more programs available to help students with autism be successful in the academic setting. These apps not only promote communication and social skills, but also classroom engagement for every student. Educators need to use these resources to help their students with autism minimize their daily struggles so they can focus on receiving the best education possible.

Conclusion

This article opens to door to future research surrounding autism and technology. Helping these children will make a huge difference in their world and allow them to make wonderful strides. As stated, federal law requires that every child with a disability has the right to be educated in the least restrictive environment. This means that educators must by law provide appropriate accommodations to allow these students to access the curriculum and be able to learn among non-disabled peers. The article addressed various apps available to educators, administrators and parents to use with those with ASD. In the future, hopefully more research will develop to support educators in providing the most efficient learning environment for students with autism.

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