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Use of Classroom Technology to Promote Learning Among Students with Autism

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Use of Classroom Technology to Promote Learning Among Students with Autism

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Abstract

The use of technology in the classroom may affect the development of social skills among students – especially those on the autism spectrum, for whom social skills development is a priority. This study reports observational data from six students with and without autism, and interview data from two teachers, in grades k-2 rural New York public schools. Findings include: 1. Students with and without autism demonstrated similar levels of classroom technology use; 2. Technology use was correlated negatively with social interactions; students with autism using classroom technology interacted with others 5.7% of class time, compared to a social interaction rate of 43.5% when not using technology; 3. A similar pattern held for students without autism, with 16.6% of time on the technology involved interacting with others and 53.3% of the time not on the technology involved interacting with others. Pros and cons of technology use in the classroom for students with autism are discussed, and future directions for research are suggested

Introduction

Students spend more than six hours each day in their school, but how much of this time is our students spending looking at a screen? This study was done to determine how much time students, particularly students with autism, are spending with technology. Autism spectrum disorder (ASD) is a complex developmental spectrum disability. It typically impacts a person's ability to communicate and interact with others. Students with autism have a tougher time developing the proper social skills (Tanner, Hand, O'Toole, Lane, 2015). This time in school should be about academics, while also teaching young students about social skills. Peer relations are always changing and serve different purposes at different ages, but social development peaks and truly begins to develop during the primary years (Gifford-Smith, Brownell, 2003). Developing social skills while in school is essential to student growth and will ensure they are successful in their future. The academic focus must be there, but schools must also include social skill practice, especially at the elementary level. Schools are now using technology most often to teach academics as well as social skills. It is often true that classroom technology use is ahead of the research backing it. This study attempts to show what is currently being done in elementary classrooms and what this means for students with ASD. During this research, two rural elementary classrooms were observed. Each of these classrooms had students with autism and technology available for use. How students use this technology and how it may affect the students' social skills development is evaluated.

Definitions

Autism

In recent years, the prevalence of students that are identified on the autism spectrum has increased dramatically. The recent estimates of the prevalence of childhood ASD in the United States stand at 1 in 68, which is a 30% increase since 2008 (Tanner, et. al, 2015). These children come with unique needs that parents and teachers need to specifically address for complete student success. ASD is a spectrum disorder, meaning there is a range of needs each child may have. Some may be more functioning than others, but they all have similar characteristics that identify them as children on the spectrum. Children with autism have problems with social behaviors, including making friends, reacting to different emotions expressed, unusual approaches to others, verbal and nonverbal communication, and adapting to social behaviors (Akmanoglu, 2015; Rogers, 2000) Students with autism frequently lack the skills to socially

interact with peers which causes challenges in the school environment. These issues can include problems deciphering how other people feel from nonverbal clues, difficulties initiating and maintaining conversations, and challenges interpreting the intentions of others, peer exclusion, reliance on adults around them, or emotional outbursts (Beaumont, Rotolone, Sofronoff, 2015; Hume, Loftin, Lantz, 2009).

The most important difference in the school setting between children with autism and children without is social skill development. About 45-60% of students identified with high functioning autism are said to have the same or higher IQs of their peers, the only significant difference in these students is their social skills (Ostmeyer, Scarpa, 2012). Children with autism are also more likely to be rejected, teased, and bullied by peers as a result of their lack of social skills. This can make children feel less accepted and supported by their peers, often leading to anxiety or depression (Beaumont, et. al, 2015; Ostmeyer, Scarpa, 2012). These students are also less likely to have friends as adolescents and rely heavily on their parents (Tanner, et. al, 2015.) Inclusion of students with autism in the classroom has also been on the rise, so they have more time with peers who have typically developing social skills. About 38.5% of students with autism spend more than 80% of their day in an inclusive setting. This is a great environment for social skill development for students with or without autism because they have more opportunities for interactions, have positive role models, and have more opportunities to learn about differences (Owen-DeSchryver, Carr, Cale, Blakely-Smith, 2008; Strain, Schwartz, Barton, 2011). As the number of children with autism increases, teachers need to be aware of the most beneficial teaching practices to use to increase student success in the classroom.

Social Skill Development

There have been an increasing number of studies done in the last few decades that further explain what autism is and shows that the lack of social skill development is the primary factor that differentiates children on the autism spectrum disorder (ASD) and children that are not. This new knowledge of ASD also explains the increase in students identified as autistic in recent years. (Reichow, Volkmar, 2010). Children with autism do not take the opportunities to develop their social skills as early as typically developing children. Typically developing children begin to practice and evaluate social situations from a young age, so when they are school age, they are more readily equipped for any social situation (Stichter, O'Conner, Herzog, Leirheimer, McGhee, 2012). This is why it is crucial that children on the spectrum get as many of these social opportunities when they are in school as possible (Özen, 2015). Learning to interact positively with peers is an important social skill that is typically acquired during early childhood. Studies indicate that children with ASD spend less time interacting with peers than typically developing children, have lower quality interactions when they play with peers, and maintain a greater physical distance from peers (Katz, Girolametto, 2013). The quality and quantity of social interactions by students with autism shape their overall well-being, so for students with autism, social interactions with peers are extremely important. Social interactions can influence a student's success in school, social and emotional development, and quality of life (Watkins, O'Reilly, Kuhn, Gevarter, Lancioni, Sigafoos, Lang, 2015)

In modern times, schools primarily focus on academic performance, test scores, and accountability. They do not focus on social interactions or skills, which are many students' deficits. Children's peer acceptance, the ability to make and maintain friendships, and their participation in larger peer largely affect a student's success in school (Gifford-Smith, Brownell,

2003; Rubin, Bukowski, Laursen, 2009). This peer rejection can also lead to aggression at older ages. Making and keeping friends requires an assortment of socioemotional and social-cognitive skills, including perspective-taking ability, affect recognition, communicative skills, self-regulation, understanding of intentions, desires, and beliefs in others, social information processing skills, and social problem solving strategies (Carter, Sisco, Chung, Stanton-Chapman, 2010). While it is recognized that children can have friendships in many different contexts, they spend the greatest amount of time at school. It is the context in which social relationships can have added benefit to both social and academic development. For children with ASD, school is the environment in which they can feel the greatest loneliness and isolation (Kasari, Locke, Gulsrud, Rotheram-Fuller, 2011, pg.535). Participation in social play and leisure pursuits are very important for these students' social development and should implemented in the classroom to better fit the needs of every student.

Technology

Technology is something that is used in everyday life for all students, whether it is in school or out of school. One study found that most children use technology for about 15-20 hours a week and the preferred technology was television (Nagar, James, Sah, 2013). The types of technology most used in the classroom were; games, assistive technologies, interfaces, portable devices, robotic devices, software, and videos (Virnes, Kärnä, Vellonen, 2015). This study focuses on instructional technology over assistive technology. This means technology that is used in the classroom for all students to use, not simply pieces of technology to fit the needs of a student with disabilities. Instructional technology can include SmartBoards, iPad apps, or laptops.

In a review of many different interventions with students with autism, it was found that 67% of technology interventions focus on education and academics while only 31% focus on social needs (Virnes, et. al, 2015). Google proclaimed that there are about 20,000 apps used for educational purposes (Simmons, 2014). Several apps have been created specifically to meet the social needs of students with autism. *Austimate* uses visuals and video modeling to improve communication skills. *SocialSkillBuilder* is an app that displays positive social interactions. *Give Me 5* is another application used with autistic learners to show social interactions and how to react to certain situations. ITake turns app on iPad was shown to help young learners to take turns (Kim, Clarke, 2015). These apps have been generated to target students with autism and are used in the field to develop better social skills within this population.

Literature Review

Pros of Technology

There are many positive aspects of using technology in the classroom with any students, including students who have autism. Technology can allow instruction to be repeated and go at the unique pace of each student. It is not a "one size fits all" type of learning, but allows each student to receive instruction at their own level and pace. In addition, students seem more interested and exhibit less problem behaviors during a lesson on technology (Mechling, Gast, Cronin, 2006; Pennington, 2010). Not only do students exhibit this higher level of attention and motivation while on technology, they receive immediate feedback on their learning. In modern days, children are often experts with technology from a very young age, making it a useful tool for them to continue learning (Oien, 2014). Technology is used even more heavily in adult life

and in many careers, so it can be said to better prepare our students for this technology use in their futures (King-Sears, Evmenova, 2007; Burgstahler, 2003). It can be a highly motivating and suitable means to learn.

Technology also has its benefits specifically for students with autism. Students with autism learn well with visuals, making technology a good option (Bernard-Opitz, Sriram, Nakhoda-Sapuan, 2001). Using technology can also improve play skills, decrease challenging behaviors, provide video models, and help with speech for students with autism (Kim, Clarke, 2015). Use of certain technologies increases students' independence, which helps them in their future. Students with autism tend to over-rely on adult help, which can cause issues in the future. With technology, there can be less teacher assistance needed (Hume, et. al, 2009).

There are several types of instructional technology that are used in the classroom that have specific benefits for students with autism. These include video modeling and iPads. Video modeling helps with facial feature recognition. The video shows an emotion and the child must try to imitate it. It is a fun way to make emotions clear to children (Akmanoglu, 2015). Video modeling also has interventions showing a conflict on a computer and asks the student how you could respond to it. This training over time helps the student answer correctly and understand what to do in that specific social situation if they came across it in real life. It was tested in Reichow & Volkmar's research of video modeling went along with research of many other interventions, including parent education, peer modeling/training, and social skills groups. Video modeling was found to be effective, but may not be the best option. It also seemed to work much better when it was used with another method, so they take what they learned through the technology and can learn to apply it in real life scenarios (2010). There are four styles of video modeling; modeling with video clips of positive examples, watching own social behaviors that were recorded and getting feedback, watching video and performing what was shown directly after, and computer programs that visually teach social cues or facial expression (Alzyoudi, Sartawi, Almuhiri, 2015). It can be useful to show students a social behavior or situation and how to properly react.

Another useful tool for students in the classroom are iPads. Researchers stated, "classrooms have been implementing many technologies, particularly iPads, into their curriculum for children on the spectrum because they believe it improves their behaviors and learning. It is said to decrease negative behaviors in the classroom" (Neely, Rispoli, Camargo, Davis, Boles, 2013). Their study showed that once the iPad was introduced, the level of negative behavior issues decreased and the level of academic interest increased. A study was done that had students play on iPads with a student with autism. This play helped the student with autism learn the rules of the game, taking turns, and how to play with others. Just as other play opportunities, this is something that gaming apps can help with (Özen, 2015). These devices also allow students to use social media in the classroom for educational purposes, which has been shown to have positive social outcomes and brings the class together (Churcher, Downs, Tewksbury, 2014). Discussion boards via Facebook, extra credit questions on twitter, create a classroom group to make a community feeling, particularly for older students. In addition, having a variety of teaching methods can provide the teaching, support, and structure needed to increase children's academic performance and independence.

Cons of Technology

Along with positive aspects of technology use in the classroom, there can also be downsides. Most interventions and studies are done with few student participants and cannot possibly prove technology to be helpful for every student with autism. The generalizations made do not prove factual information about students with ASD. After reviewing many studies on this topic, it was found that most results showed positive results for using technology, but only four of the studies were "acceptable or high quality based on the NSTTAC criteria, therefore, there was not enough evidence to determine the effectiveness of technology based interventions." This shows that there is no proven reason to believe that technology is the way to get across to students with autism. Teachers seem to be adopting more technology well in advance of solid knowledge concerning the impact. Until there are more efficient studies out about this topic, teachers should be wary of overusing technology (Knight, McKissick, Saunders, 2013.) Children with autism seem to have the same interest in technology and use it just as often as typically developing children. There is no sound reason to have children use technology more often in the classroom simply because they have autism. (Nagar, et. al, 2013). There is little to no evidence that shows lessons on technology teach students with autism, or general education students, to a greater degree than standard instruction (Pennington, 2010).

It is true that many children often have access to technology at all hours of the day in current times. This however, has not consistently proven to be positive. Technology such as television, cell phones, tablets, laptops, and video games have actually been proven to delay speech, increase violent behaviors, and increase obesity (Nagar, et. al, 2013). Yes, students have technology available at home so it creates a bridge to school technology, but at home students do not use it for educational purposes (O'Malley, Lewis, Donehower, Stone, 2014). In school, iPads, computers, and SmartBoards are most frequently used. As home, television, iPads, computers, and video games are most frequently used (Nagar, et. al, 2013). Teachers are also often not educated about the classroom technology themselves so it is not used to its fullest potential (O'Malley, et. al, 2014). In many districts, they can afford the new technology, but do not have enough supply teachers with training sessions (Middleton, Murray, 1999). These teacher education sessions are crucial because they allow the teachers to use the technology in the classroom to its highest potential. If teachers do not understand how to use the technology they are provided with, they will misuse it. In addition, when analyzing the effectiveness of video modeling, it was found that there is no proof if the social skills taught on the technology transforms to real-life scenarios. Students using video modeling could be learning these social cues through the technology, but not understand how to apply these skills to their own life (Akmanoglu, 2015). A study was conducted by Akmanoglu that tested four students with ASD. They were given online trainings of eight simple emotions through video modeling and then tested directly after and a week later. This study found that the emotional/social knowledge obtained through video modeling is not long-term and cannot be easily applied into real life situations (2015).

With the steadily increasing population of students with autism in modern day schools, teachers are becoming overwhelmed. They must adapt and teach to each students' unique needs, including students with ASD. This means they must meet academic as well as social goals in the classroom. There has been a lot of research conducted to determine what is best for instructing students with autism. Results include;

- having a quiet area
- labeling areas with words and pictures

- having a clear a schedule and known rules
- transitioning smoothly
- remove possible sensory triggers
- including sensory objects into lessons
- having partner work centers
- allow them to make some choices of their own throughout the day

There is no mention of technology use being one of the best methods used to teach students with autism (Deris, Di Carlo, 2013; McConnell, 2002). In addition, technology is often used as an option during play time in elementary schools. This time is crucial for social skill development in students, which is what students with autism need more time developing (Harper, Symon, Frea, 2008). When they use this time to play individually on an iPad, it is not allowing them this social practice. They should use this time wisely communicating with others rather than playing a game on technology. Although there may be benefits to this increases technology use in the classroom, there are signs that it may not be the right type of instruction for students with autism. It is known that classroom technology is advancing in the classroom and there are positive and negative aspects to this. What is unknown is how this technology use impacts student with autism and their social skill development.

Research Questions

To find out what students with autism are actually doing in the classroom, I will be observing multiple classrooms to observe what apps they use, how long they use them for each day, and compare this information gathered to their peers who are not on the spectrum. The classrooms observed was a second-grade general education classroom and a special education classroom with students ranging from kindergarten to second grade. These levels and classrooms were chosen because social skills development occurs most rapidly at a young age for students. In addition, these classrooms observed each had at least two students with ASD in the class. I will also be interviewing the teachers whose classrooms I am observing to get an idea of the student's growth over the school year and better understand their classrooms. I will not use the actual students' identity that I am observing. Students, teachers, and the school discussed below will not be identified or be given pseudonyms. This observation and interview process will help me answer most of my research questions, but I will also be doing online research.

1. Do students with autism in grades K-2 use technology in the classroom and what programs are they typically using?
2. How does technology use affect the number of social interactions throughout the day for all students in grades K-2?
3. What are the positives and negatives associated with using technology in the classroom with students with autism? This is as stated by current classroom teachers and identified by me through analysis of the research done.

Methodology

Contacting Schools/Selection Criteria

For this research, I chose to work with elementary students because this is the point in the students' lives that social skills are developing at the highest rate. Students learn these crucial skills primarily in the younger years. It is a such a significant time for social skill development

because of play (Katz, Girolametto, 2013). It is during play that children first begin to learn these social cues and begin engaging in social interactions. Social skill development begins with play and develops more and more as they age, making elementary aged students the perfect age to research the questions addressed.

I decided to work within one elementary school and observe a general education classroom as well as a 6-1-1 classroom. A 6-1-1 classroom means there are no more than six students in the classroom, one special education teacher, and one teacher's assistant. This set-up serves students with high needs who need an intense structured individualized program. This elementary school is in a rural area and has pre-kindergarten through fourth grade in the building. This allowed me to still see multiple different settings and experience more diversity to get more accurate answers to my research questions. The principal connected me with classroom teachers that I could do my observations and interviews with. I emailed these teachers to get their permission, which they both immediately agreed to. I then set up dates with them to observe their classroom within that school year.

Setting

The elementary school where I did my research is a relatively small school in a rural area. There are about 120 students per grade level and 1,354 students enrolled to the district. It has grades pre-kindergarten through 4th grade. There is one special education classroom that is a kindergarten through 2nd grade classroom with four students, one aide, and one special education teacher. The remainder of the classrooms are inclusive general education classrooms. There are also two additional special education teachers in the building who push into general education classrooms to give students with IEPs additional help. The school has a predominantly white population, with 93.3% of students being Caucasian. Approximately 2.4% of students are Hispanic/Latino, 1.3% of students are African American, 1% Native American, and 1.8% of students are multiracial (NYS Dep. Of Ed, 2016).

The inclusive classroom that I did my observations in was a 2nd grade classroom that had two boys with autism. In this classroom, there were 20 students total, who sat in five groups of four. I observed this classroom on two different days for about two hours each day. During this two hours, the classroom was doing their literacy block. This generally included a whole group literacy lesson and reading centers**.** The technology in this classroom included a Smart Board, 4 computers, 5 iPads, and several audiobooks. This classroom also used "banana bucks" as an incentive and form of classroom management. Students receive coupons when they exhibit positive behaviors and can put these coupons in baskets for prizes that they can win. In addition to this, four students have letters on their desk that can get crossed off as they display negative behaviors. If they get all of the letters crossed off on that day, a note goes home to their parents.

This 6-1-1 special education classroom had four students, one aide, and one special education teacher. Th four students were all boys on the autism spectrum. They each sit at separate desks in the classroom. Two of the boys in the classroom are placed in there for the entire day due to negative behaviors around peers. The two other boys are in a first-grade general education classroom for home room, specials, and free time. This allows them time to interact with others while also giving them the one on one time they need. The technology in the classroom includes a Smart Board, four computers, four iPads (one for each student), and Osmo. Osmo is a technology that helps with vocabulary and spelling practice for students. It comes with iPad app and letters to spell out words. A picture appears on the iPad and the students lay the

letters out to spell the word. The iPad detects what you spelled with the camera and corrects it. This technology can also be social because you can compete with others.

Students

For this research, I observed six total students. Two students were observed in the special education setting, each with autism. Four students total were observed in the general education classroom; 2 with autism and 2 without. This was done to examine how teachers may use technology differently with each student based on their disability classification. To identify each student, I will be calling them student #1, student #2, etc. The table below give characteristics of each student, along with their educational setting.

Student #1	ASD, male, kindergarten, 6-1-1 classroom, most severe student observed, often tantrums/cries, very shy to new people, mimics behaviors, receives occupational therapy (OT) and speech services
Student #2	ASD, male, first grade, 6-1-1 classroom, above grade level, easily distracted, destructive behaviors, does not initiate interactions with others.
Student #3	ASD, male, second grade, general education classroom, extremely friendly and cheerful, cries when overstimulated, talks in simple sentences, gets along well with peers for the most part, receives speech services
Student #4	ASD, male, second grade, general education classroom, high-functioning autism, very quiet, rarely interacts with peers or adults
Student #5	No ASD, female, chosen because she sits in close proximity to student #3 (to make observations easier)
Student #6	No ASD, male, chosen because he sits in close proximity to student #4

Procedure

I observed each classroom for four hours total between May 31st and June 2nd, 2016. On May 31st, I observed the general education classroom from 10:30 until 12:30. At this time, the school had two weeks left of instruction before summer break and the classes were still focusing on their main curriculum. This was during the general education class literacy block. They were practicing spelling and syllables, did a lesson about tall tales, and did their reading centers. On June 1st, I observed the 6-1-1 special education classroom in the morning from 9:00-10:30. During this time, the students practiced their alphabet, did calendar work, and practiced sight words. After this observation, I returned to the inclusive classroom for a second time during their literacy block from 10:30 until 12:30. During this time, the class did a grammar worksheet, reviewed tall tales, and did reading centers. Finally, on June 2nd, I observed the 6-1-1 special education classroom for a second time in the afternoon from 1:00-3:30. The class was reading a book together and then did independent writing about something they learned from the book. They shared their writings with their peers and then went on technology for the remainder of the day.

During each observation, I spent one hour to chart the social interactions and technology use of the students with autism. I recorded the number of times each student interacted with a peer, aide, teacher, or no one in five minute intervals. In addition to this, I recorded what the student was doing every five minutes and made sure to include if technology was involved in their activities. In the inclusive classroom, I charted one student with autism and a student

without autism that sat next to them so I could have a comparison. On May 31st, I recorded the behaviors of Student #3 and Student #5. On June 1st. I recorded the behaviors of Student #4 and Student #6. In the special education classroom, I charted the Students #1 and #2 behaviors on June 2nd from 2:00-3:00. The times on technology and social interactions were then tallied. This information was recorded on a data table that I created. A blank data table is shown below in the appendix.

After I was finished with my observations, I set up times and dates with the classroom teachers to discuss what was observed and conduct a short interview. Each interview was about fifteen to twenty minutes long and helped me understand the class dynamic and each student better. The interviews were done with each teacher on June 2nd. The interview question and the teachers' responses are shown below.

Results

Observation Charts

	Percent of observed time on technology involving social interactions	Percent of observed time not on technology involving social interactions
Students with ASD	5.7%	43.5%
Students without ASD	16.6%	53.3%

I learned a lot about this topic be observing the inclusive 2nd grade classroom. I was able to spend my time observing two students with autism and two students without autism. From this, the data and observation notes were compared to determine if there was a significant difference in communication or technology time. I found that in this setting, students with autism generally do not use technology more or less than students without autism. I also noticed that during ELA activities that did not include technology, student interactions increased dramatically. As the chart depicts, 5.7% of the students' with ASD time on technology involved some sort of social interaction. This is compared to the 43.5% of time that promoted social interactions for students with ASD when they were not on technology in the classroom. The results for students without ASD were very similar, showing that they interacted with others more when they were not on technology.

Literacy centers in this classroom included; reading alone, computer time, RazKids on iPads, matching games, word study with a partner, or listening to a book. The students can choose what they want to do for centers and must record what they do during the center time. Student #3 chose to do a word game with a partner and then chose computer time. He never interacted with another student during this technology time. He was on RazKids during his technology time, which enhances his reading and comprehension skills. Student #4 chose to listen to a book alone for the entire centers time. During this, he never interacted with another student, because he was so immersed in the technology. My second day in this classroom, there was a substitute teacher for one hour of my observation. During this hour, the students did a worksheet and watched a 15-minute video. Observing while having a substitute in the classroom

could have affected what the students did during this time because "busy work" is often left. The movie was 15 minutes long and about tall tales. Many students were not paying attention to the movie. Student #3 expressed his dislike for long videos and said "I can't really watch long movies." There were little to no interactions from any of the students during the movie.

The special education classroom also gave me a great idea of what students with autism truly do on technology in the classroom and see how it may affect their social skill development. During my observation, they practiced sight words and spelling through videos on the Smart Board. This class must watch these videos often because they had the songs and dances memorized. They watched an alphabet video, a song about letters and sounds, and a sight word rap video. During this time, they did not interact with others, but were participating in the song on the Smart Board. They then read a book as a whole group about desert animals and wrote about one desert animal they learned about from the reading. Many of their interactions were with teachers and included being redirected or answering a question that was asked. They did not have many interactions with peers, which may also be because they are not in an inclusive setting. Each of their main struggle is with social interactions, so they additionally do not know how to properly interact with one another. I noticed a lot of mimicking in this classroom. Unfortunately, the majority of the mimicking was with negative behaviors such as shaking hands, being off topic, or touching their mouth while talking.

Teacher Interviews

After interviewing the second-grade general education teacher, I learned a lot more about her classroom dynamic and the students I was observing. This teacher expressed how she has more and more students each year that are on the autism spectrum, and she is becoming more aware how to assist each of them. She also explained that she primarily uses the SmartBoard and iPads for technology in the classroom. She finds that students, especially students with ASD, are very motived by using technology and she often uses it as a reward for positive behavior. Technology is estimated to be used about one hour of each day in this general education classroom, but she does not use it more with students with ASD than students without. She also noticed positives as well as negatives to using this technology, because she has also noticed the decline in social interactions when using technology. In addition, she said that technology use can sometimes be a distraction or difficult for students to be redirected away from. This second-grade general education teacher helped me better understand the realities of what technology use in the classroom in with students on the autism spectrum.

The special education teacher also gave me insight on this topic as well as the classroom and students that were observed. This classroom is made up of all boys who are on the autism spectrum, so her perspective was slightly different from the general education teacher. She explained that technology is used often in this classroom because it is a huge motivator for her students and also allows her to differentiate instruction for each of her students and their unique needs. This teacher explained that technology is used on an average of two hours each day for each of her students. They primarily use iPads, along with the SmartBoard and Osmo. It is used as a reward at the end of the day, so students who behave well all day may play on an iPad during recess time. She believes that there are only positive aspects to using technology, because she has seen how students enjoy and work on it first-hand. This special educator also stated that she wishes her students had more time to interact with others, primarily because they are not in a

general education classroom. The actual interview questions that each teacher was asked are located in the index.

Discussion

By researching scholarly articles, observing two classrooms, and interviewing teachers, I was able to obtain a better idea of students with autism and how technology may affect their social skill development in the classroom environment. It was discovered that students with autism are not on technology more than typically developing peers, but have the same opportunities to interact with it than others. For each student during the observation, they used technology on an average of twenty minutes out of the hour, whether the student had ASD or not. This idea that students with autism get more time with technology was not found to be true during the observations or interviews. It was discovered, however, that when all students were utilizing technology in the classroom, the number of social interactions plummeted. For students with ASD, the percent of time the student interacted with others while on technology was 16.6%, while the percent of time the student interacted with others while not on technology was 53.3%. The numbers showed a similar relationship for students without ASD. On technology, these students engaged with others for 5.7% of the time, while when they were not on technology, they interacted with others for 43.5% of the time. This can display how technology truly affects the amount of social interactions in the classroom. While students are on technology, the number of social interactions went from an average of two to three every five minutes to zero. This can show that when students are on technology, they are not practicing or using their social skills. This lack of social skills being used may not be a huge setback for some, but for students with autism this social skill time is crucial. They need as much practice as possible, so using technology for hours a day in school may have additional negative effects on their social skill development. Students with autism need time to interact with others and learn social cues more than other students, especially at a young age.

Technology can facilitate meeting specific needs of students with autism when educators maximize the use of the technology and the purposes for which they and their students use it. It can be used as an educational tool, but needs to be used along with other strategies and in moderation. Maximizing the effectiveness of available technology requires thoughtful planning and decision making. Educators also need skills and technical assistance so that they can effectively integrate technological activities into tasks to make them appropriate. This means schools should educate their teachers so they can implement the best strategies for the increasing number of students that are on the autism spectrum in their classroom.

Conclusion

If a student is shown to communicate less with others while on technology, technology should be used at a minimum. This is because this social communication issue is what truly needs to be worked on for many students at the elementary level, especially students with autism. Throughout this study, only two different classroom environments were observed. With these few student participants and few hours that were observed, a general idea of this topic was able to be determined. The focal students in this study were all very intelligent and on grade level for reading and mathematics, but needed extra help with social interactions and behaviors. Technology time will not help their advances in social development, only halt it. Observations were made for two days, but even if this is a normal routine for the students, they get this

technology time for at least an hour each day. That is an hour taken away from their six hours of school every day and will not help them advance their social skills.

References

Akmanoglu, N. (2015). Effectiveness of teaching naming facial expression to children with autism via video modeling. Educational sciences: Theory and practice, 15(2), 519-537.

Alzyoudi, M., Sartawi, A., & Almuhiri, O. (2015). The impact of video modelling on improving social skills in children with autism. British Journal of Special Education, 42(1), 53-68.

Beaumont, R., Rotolone, C., & Sofronoff, K. (2015). The secret agent society social skills program for children with high-functioning autism spectrum disorders: A comparison of two school variants. Psychology in The Schools, 52(4), 390-402. doi:10.1002/pits.21831

Bernard-Opitz, V., Sriram, N., & Nakhoda-Sapuan, S. (2001). Enhancing social problem solving in children with autism and normal children through computer-assisted instruction. Journal of Autism and Developmental Disorders, 31 (4), 377–384.

Burgstahler, S. (2003). The role of technology in preparing youth with disabilities for postsecondary education and employment. Journal of Special Education Technology, 18(4), 7-19.

Carter, E. W., Sisco, L. G., Chung, Y., & Stanton-Chapman, T. L. (2010). Peer interactions of students with intellectual disabilities and/or autism: A map of the intervention literature. Research & Practice for Persons with Severe Disabilities, 35, 36–79

Churcher, K. A., Downs, E., & Tewksbury, D. (2014). "Friending" Vygotsky: A social constructivist pedagogy of knowledge building through classroom social media use. Journal of Effective Teaching, 14(1), 33-50.

Deris, A. R., & Di Carlo, C. F. (2013). Back to basics: Working with young children with autism in inclusive classrooms. Support for Learning, 28(2), 52-56.

Gifford-Smith, M. E., & Brownell, C. A. (2003). Childhood peer relationships: Social acceptance, friendships, and peer networks. Journal of School Psychology, 41(4), 235-284. doi:10.1016/S0022-4405(03)00048-7

Harper, C. B., Symon, J. B. G., & Frea, W. D. (2008). Recess is time-in: Using peers to improve social skills of children with autism. Journal of Autism and Developmental Disorders, 38, 815–826.

Hume, K., Loftin, R., & Lantz, J. (2009). Increasing independence in autism spectrum disorders: A review of three focused interventions. Journal of Autism & Developmental Disorders, 39(9), 1329-1338. doi:10.1007/s10803-009-0751-2

Kasari, C., Locke, J., Gulsrud, A., & Rotheram-Fuller, E. (2011). Social networks and friendships at school: Comparing children with and without ASD. Journal of Autism and Developmental Disorders, 41, 533–544.

Katz, E., & Girolametto, L. (2013). Peer-mediated intervention for preschoolers with ASD implemented in early childhood education settings. Topics in Early Childhood Special Education, 33(3), 133–143

Kim, S., & Clarke, E. (2015). Case study: An iPad-based intervention on turn-taking behaviors in preschoolers with autism. Behavioral Development Bulletin, 20(2), 253-264. doi:10.1037/h0101314

King-Sears, M. E., & Evmenova, A. S. (2007). Premises, principles, and processes for integrating technology into instruction. Teaching Exceptional Children, 40(1), 6-14.

Knight, V., McKissick, B. b., & Saunders, A. (2013). A review of technology-based interventions to teach academic skills to students with autism spectrum disorder. Journal of Autism & Developmental Disorders, 43(11), 2628-2648. doi:10.1007/s10803-013-1814-y

McConnell, S. R. (2002). Interventions to facilitate social interaction for young children with autism: Review of available research and recommendations for educational intervention and future research. Journal of Autism and Developmental Disorders, 32, 351–372.

Mechling, L. C., Gast, D. L., & Cronin, B. A. (2006). The effects of presenting high-preference items, paired with choice, via computer-based video programming on task completion of students with autism. Focus on Autism & Other Developmental Disabilities, 21(1), 7-13. doi:10.1177/10883576060210010201

Middleton, B. M., & Murray, R. K. (1999). The impact of instructional technology on student academic achievement in reading and mathematics. International Journal of Instructional Media, 26(1), 109-116.

Nagar, A., James, M., & Sah, V. s. (2013). A comparative study on the impact of media viewing on early childhood on typically developing children and children with autism. Journal of The All India Institute of Speech & Hearing, 62-67.

Neely, L., Rispoli, M., Camargo, S., Davis, H., & Boles, M. (2013). The effect of instructional use of an iPad on challenging behavior and academic engagement for two students with autism. Research in Autism Spectrum Disorders, 7(4), 509-516.

New York State Department of Education. (2016). NYSED Data Site. Retrieved December 07, 2016, from https://data.nysed.gov/

Oien, R. (2014). Review of apps for autism: An essential guide to over 200 effective apps for improving communication, behavior, social skills, and more! Journal of Autism and Developmental Disorders, 44(9), 2381-2382. doi:10.1007/s10803-014-2134-6

O'Malley, P., Lewis, M. B., Donehower, C., & Stone, D. (2014). Effectiveness of using iPads to increase academic task completion by students with autism. Universal Journal of Educational Research, 2(1), 90-97.

Ostmeyer, K., & Scarpa, A. (2012). Examining school-based social skills program needs and barriers for students with high-functioning autism spectrum disorders using participatory action research. Psychology in The Schools, 49(10), 932-941. doi:10.1002/pits.21646

Owen-DeSchryver, J., Carr, E., Cale, S., & Blakeley-Smith, A. (2008). Promoting social interactions between students with autism spectrum disorders and their peers in inclusive school settings. Focus on Autism and Other Developmental Disabilities, 23, 15–28.

Özen, A. (2015). Effectiveness of siblings-delivered iPad game activities in teaching social interaction skills to children with autism spectrum disorders. Educational Sciences: Theory & Practice, 15(5), 1287-1303. doi:10.12738/estp.2015.5.2830

Pennington, R. C. (2010). Computer-assisted instruction for teaching academic skills to students with autism spectrum disorders: A review of literature. Focus on Autism and Other Developmental Disabilities, 25(4), 239-248. doi:10.1177/1088357610378291

Reichow, B., & Volkmar, F. R. (2010). Social skills interventions for individuals with autism: Evaluation for evidence-based practices within a best evidence synthesis framework. Journal of Autism and Developmental Disorders, 40, 149–166.

Rogers, S. J. (2000). Interventions that facilitate socialization in children with autism. Journal of Autism & Developmental Disorders, 30(5), 399-409.

Rubin, K. H., Bukowski, W. M., & Laursen, B. (Eds.). (2009). Handbook of peer interactions, relationships, and groups. New York, NY: Guilford Press.

Simmons, K. (2014). Apps for communication and video modeling for middle school students with autism spectrum disorders. Journal of Instructional Psychology, 41(1-4), 79-82.

Stichter, J., O'Connor, K., Herzog, M., Lierheimer, K., & McGhee, S. (2012). Social competence intervention for elementary students with Asperger syndrome and high functioning autism. Journal of Autism & Developmental Disorders, 42(3), 354-366. Doi: 10.1007/s10803-011-1249-2

Strain, P. S., Schwartz, I. S., & Barton, E. E. (2011). Providing interventions for young children with autism spectrum disorders: What we still need to accomplish. Journal of Early Intervention, 33(4), 321-332. doi:10.1177/1053815111429970

Tanner, K., Hand, B. N., O'Toole, G., & Lane, A. E. (2015). Effectiveness of interventions to improve social participation, play, leisure, and restricted and repetitive behaviors in people with autism spectrum disorder: A systematic review. American Journal of Occupational Therapy, 69(5), p1-p12. doi:10.5014/ajot.2015.017806

Virnes, M. m., Kärnä, E., & Vellonen, V. (2015). Review of research on children with autism spectrum disorder and the use of technology. Journal of Special Education Technology, 30(1), 13-27.

Watkins, L. l., O'Reilly, M., Kuhn, M., Gevarter, C., Lancioni, G., Sigafoos, J., & Lang, R. (2015). A review of peer-mediated social interaction interventions for students with autism in inclusive settings. Journal of Autism & Developmental Disorders, 45(4), 1070-1083. doi:10.1007/s10803-014-2264-x

Appendix

Blank Data Table

Time Interval (minutes)	Interactions with Teacher	Interactions with Peers	Interactions with Others (aide, specialist, etc.)	Interactions through Writing	Opportunities to Interact with Others
0-5					
5-10					
10-15					
15-20					
20-25					
25-30					
30-35					
35-40					
40-45					
45-50					
50-55					
55-60					

Time Interval (minutes)	Activity Student is Working on	Time on Technology	Purpose of Technology Use
0-5			
5-10			
10-15			
15-20			
20-25			
25-30			
30-35			
35-40			
40-45			
45-50			
50-55			
55-60			

General Education Teacher Interview Questions

1) Describe your class
2) What are your experiences teaching/students with autism? What do you do specifically to service students who are autistic?
3) How often do you use technology in a regular scheduled literacy block?
4) Do students with autism use technology any different than students without autism?
5) What technology are students with autism using?
6) Please describe when and how students with autism work on social skills development during the school day. When do students with autism have opportunities for social development?
7) What role do you see technology having on the education of students on the autism spectrum?
8) Can you share an example of a time when you used technology with students on the spectrum and a) it was successful and b) it was not as successful

Special Education Teacher Interview Questions

1) Describe your class
2) How do you reach these students specific needs?
3) How often a day do you see the students from this classroom?
4) How often do you use technology with students with autism when you are with them?
5) What technology are the students with autism using? For what purpose and to what extent has it been successful?
6) Please describe when and how students with autism work on social skills development during the school day. When do students with autism have opportunities for social development?
7) What role do you see technology having on the education of students on the autism spectrum?
8) Can you share an example of a time when you used technology with students on the spectrum and a) it was successful, and b) it was not as successful?