Special Education Teachers' Perspectives Toward Tablet-Based Augmentative Alternative Communication (AAC) Devices

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Abstract

Several communication interventions have been used with nonverbal individuals with autism spectrum disorder (ASD) for a long time. One of these methods that are effective in enhancing the communication skills of these individuals is tablet-based devices (e.g., iPads). Special education teachers have a significant role in successfully implementing the augmentative alternative communication (AAC) intervention. Therefore, this study used a qualitative approach to determine special education teachers' perspectives on the effectiveness of iPads as an AAC system and the barriers they face when using such devices. The researcher interviewed two special education teachers who had experience using iPads for communication in their classrooms. In addition to the semi-structured interviews, the researcher observed group/individualized instructions and noted the teachers' reactions to using iPads to communicate with their students. The findings indicated that practitioners had positive attitudes toward using iPads for communication. As for the difficulties, teachers stated that one of the significant barriers was having students whose perspective of the iPad as an entertainment tool only.

Keywords: augmentative and alternative communication, autism spectrum disorder, special education teacher, qualitative research, communication interventions

1. Introduction

1.1 Introduce the Problem

Deficit in communication skills is one of the most common symptoms of individuals with autism spectrum disorder (ASD). Many of these individuals need more effective communication to meet their daily needs. Thus, they tend to exhibit challenging behavior (e.g., aggression and self-injurious behaviors) when communicating in their environment (Chiang, 2008). Augmentative and alternative communication (AAC) methods have been used to enhance communication skills among individuals with ASD. Three main methods reported to be effective AAC interventions for individuals with ASD are the following: manual signs (MS), picture communication systems (PCS), and speech-generating devices (SGD; Lorah et al., 2013). SGDs are frequently used by students with ASD and developmental disabilities in educational settings. One of the factors that led these devices to be chosen as AAC interventions is their voice-output feedback (Koul & Schlosser, 2004). Recently, there has been an orientation toward using tablet-based computers (e.g., iPads) as an AAC intervention. Several systematic reviews and meta-analyses have revealed that iOS devices, specifically iPads, helped improve the communication skills of individuals with ASD and developmental disabilities (e.g., Aydin & Diken, 2020; Crowe, Machalicek, Wei, Drew, & Ganz, 2022).

Tablet devices and their applications (apps) have been frequently used in the educational environment, specifically as a communication intervention for individuals with complex communication needs (CCNs). However, this field is a new area that needs to be investigated to provide empirical results about the effectiveness of tablet-based communication intervention (Clark, Austin, & Craike, 2015). Clark et al. (2015) stated that for tablet-based devices to be evidence-based practice, it is essential to determine the attitudes and behaviors of professionals toward using such devices as communication intervention for individuals with ASD. Examining social validity will help establish these devices as an evidence-based practice. Socially valid interventions have more credibility than those lacking such validity (Schlosser, 2003). Practitioners are more likely to use socially valid interventions.

1.2 Explore Importance of the Problem

Special education teachers are responsible for implementing AAC interventions for students with CCNs. Some are related to providing opportunities for students to communicate using the AAC method, collecting progress data, and making ongoing adjustments to the AAC method (Locke & Mirenda, 1992). Special education teachers play a critical role in determining the effectiveness of AAC interventions (Soto, 1997). For instance, giving a child with CCN a high-tech device (e.g., Dynavox) without training opportunities throughout the school day would not help the child be a competent communicator. For students with CCN to benefit from communication interventions, teachers have to train these students by using intensive teaching strategies. Practitioners' attitudes toward interventions significantly impact the implementation process and the outcomes. Several studies have shown a correlation between teachers' perspectives toward interventions and their practice in educational settings (Aldridge & Clayton, 1987; Eisenhart, Shrum, Harding, & Cuthbert, 1988; Johnson, 1992). Guskey (1988) stated that teachers with positive attitudes toward interventions tend to implement these interventions effectively. Schlosser (2003) defined *social validity* as assessing stakeholders' (e.g., teachers and parents) perspectives about the determined goals, the implemented methods, and the collected outcomes. Investigators in tablet-based AAC methods must assess the social validity to help students with CCN benefit from these methods to the maximum extent possible.

1.3 Describe Relevant Scholarship

The literature review revealed that different studies investigated practitioners' perspectives toward using AAC interventions in general and tablet-based devices in particular. Soto's study (1997) showed that teachers' beliefs about their students' abilities to learn communicational skills were the positive factor that led them to implement AAC interventions. Six special education teachers and one speech-language pathologist were interviewed to determine their attitudes toward implementing AAC interventions on adolescents with CCNs. The study results indicated that the participants have positive perspectives about AAC interventions (Bailey, Stoner, Parette, & Angell, 2006). A study by Johnson (2013) showed that teachers reported that iPads helped improve the communication skills of their students with ASD. Clark et al. (2015) investigated parents' and professionals' perspectives on the use of iPads by their students with ASD. The study results indicated that parents and professionals have positive views about using iPads as an intervention; however, professionals showed inconsistent use of the device in their classrooms.

In a single-subject design study, the social validity data showed that teachers thought iPads were more effective than other AAC methods (e.g., communication books) (Flores et al., 2012). In another study, the results of the Behavioral Intervention Rating Scale (BIRS) (Elliott & Treuting, 1991) indicated that teachers' perspectives about iPad-based SGDs were an acceptable and effective intervention (Strasberger & Ferreri, 2013). There is a critical need for more empirical results about professionals' perspectives toward using tablet-based SGDs as AAC intervention (Alzrayer, Banda, Koul, 2014). Therefore, the goal of this study was to provide insight into the social validity of high-tech SGDs, as well as to determine the barriers that teachers encounter when implementing these devices.

1.4 State Hypotheses and Their Correspondence to Research Design

More is needed for an intervention to be effective. We could have an effective intervention that helps reach specific goals, but teachers think of this intervention as cumbersome and time-consuming. Having negative attitudes toward an intervention would prevent stakeholders (e.g., teachers, parents, and professionals) from reaching the desired outcome caused by applying the intervention. One way to detect stakeholders' perspectives regarding an intervention is by evaluating its social validity. The evaluation of the social validity reveals what stakeholders think of how important it is to solve the problem, how effective the intervention is, and how likely they plan to implement it. Even though social validity is essential for best practice, there is a need for more information related to this type of evaluation and AAC methods. Kennedy (1992) mentioned a need for more data on the social validity of AAC interventions. More importantly, the literature must reveal professionals' perspectives on using tablet devices as an AAC model. Teachers and speech-language pathologists are required by law to implement evidence-based interventions for individuals with disabilities ("Individuals with Disabilities Education Act," 2004). For professionals to implement tablet-based communication intervention as an evidence-based practice, these interventions must be socially validated.

Based on the lack of social validity and tablet-based AAC devices, the purpose of this study was to examine the perspectives of special education teachers about the use of tablet devices (iPads) as an AAC method, as well as to determine the difficulties that teachers face when implementing these devices in their classrooms.

2. Method

The qualitative descriptive research method was used to investigate practitioners' attitudes toward using tablet-based communication intervention and the barriers they faced when implementing high-tech devices (e.g., iPads). The researcher used a collective case study to describe the social validity of the tablet-based communication intervention. The main reason for selecting this method was that it helped the researcher provide detailed descriptions and better understand practitioners' perspectives by investigating several cases within a bounded system. This approach helped the researcher reach valid, precise, and stable results (Stake, 2000).

2.1 Sampling Procedures

There were two main inclusion criteria for the participants in the study. First, the participant had to be a special education teacher who was currently providing instructions to students with ASD in a self-contained classroom (e.g., autism support or life skills). Second, the participant had to have experience using tablet devices for AAC intervention for nonverbal students with ASD.

The researcher emailed Ms. Ali a certificate of clinical competence in speech-language pathology (CCC-SLP) and a certified behavior analyst (BCBA) to help recruit possible participants who met the inclusion criteria. She was an educational consultant for autism support at a school district in the northeastern United States. The researcher knew Ms. Ali as a student teacher attending a university in the northeast region of the United States. Ms. Ali was an autism specialist who visited special education classrooms to provide consultation for teachers and paraprofessionals. Ms. Ali was also the researcher's former coach in training a specific program for two years. The gatekeeper, Ms. Ali, contacted several special education teachers who were willing to participate in the study. She sent the researcher emails to two special education teachers who met the inclusion criteria. The teachers included in this study were from two different school districts. The main reason for choosing schools in the northeastern United States was the convenience since the researcher has completed field experience in schools in that area. The other reason was that schools in that state have advanced experiences applying tablet-based communication interventions to students with ASD.

2.2 Participant (Subject) Characteristics

The first participant (Ms. John) worked as a special education teacher in a school district in the northeastern region of the United States. The district served about 3,600 students from kindergarten level through twelfth grade. The number of students who needed special education services was 401; 19.2% of these students were diagnosed with ASD. Ms. John worked as an autism teacher in a self-contained autism support classroom. She received a bachelor's degree in elementary education and a master's degree in special education from a university in the northeastern region of the United States. She had been teaching in an autism classroom for the past 14 years. She was teaching six students with ASD from sixth to eighth grade. The student's ages range from 12 to 15 years old. The students' functional level was low and had some communication needs. Four students out of six used tablet-based communication devices (iPads). In addition, all the students used communication books (e.g., picture cards) and visual cues throughout the school day to transition from one activity to another and review routines. The students also exhibited challenging behaviors, such as hitting, kicking, spitting, and pulling hair. The teacher knew two of her students using communication devices for about one month, and the other two for about a year. One of her students started to use the iPad for communication at the beginning of this year, and the other three students had been using the iPad since elementary school. Ms. John instructed the students using a one-on-one format, 30-minute increments. She also provided group instructions frequently to help the students interact with each other. Eight staff members were in the classroom: the primary teacher (Ms. John), a classroom paraprofessional, two therapeutic supporting staff (TSS), and four personal care assistants.

The second participant (Mr. Eric) worked as a special education teacher in the northeastern region of the United States. The approximate number of students who received education from the district was 3,271; 427 received special education services. The percentage of students who were diagnosed with ASD was 9.8%. Mr. Eric worked as an autism teacher in a self-contained autism support classroom in a high school in the northeastern region of the United States. The participant had a bachelor's degree in elementary education (K-6) and a master's degree in special education (8-12) from a local university. The teacher had a variety of experience in both general and particular education fields. While completing the requirements for the master's degree program, Mr. Eric was an autism teacher for about six months at a private school for students with ASD in the northeastern region of the United States. Then, Mr. Eric worked as a paraprofessional at the local school district last year. Halfway through last year, the participant was promoted to primary teacher in the autism support classroom. The participant had a long history of working with his current students. Mr. Eric had five students aged 14 to 17 years old.

The students' functional level in communication ranged from middle to low level. Two students out of five were

using tablet-based communication devices. One student with hearing impairment was using American Sign Language (ASL) and iPad for communication. Another vocal student used a low-tech communication device called "Flip 'n Talk." The other two students were verbal but had communication deficits, such as echolalia and scripting. The teacher provided one-on-one instruction for the students using the "Language for Learning Program" and group instruction using a visual curriculum called "Unique Learning System." In addition, the students spent 30 minutes a day practicing certain skills (e.g., telling money and time and reading functional words) using a program called "Vizzle." Mr. Eric had known the student using the iPad for communication for about a month. The teacher had known the other student with hearing impairment for about three years. The teacher had seen the student trying different high- and low-tech devices before using the iPad. Five staff members were in the classroom, including the primary teacher (Mr. Eric), TSS, a paraprofessional, and two personal care assistants.

2.3 Procedure

The data collection methods used for this research were semi-structured interviews and direct observations. The main reason for selecting a semi-structured interview was to allow the researcher to ask the participants to clarify their responses and ask questions based on their responses. The researcher conducted a one-on-one interview with each participant for approximately 30 minutes through video conferences (e.g., FaceTime and Skype). The researcher started the interview by thanking the teacher for their participation, ensuring the confidence of the recorded interview and their ability to ask questions while collecting the data. The questions that the interviewer asked covered multiple areas. The participants were asked to provide general information about themselves and their students (e.g., qualification, number of students, number of paraprofessionals/specialists, type of disabilities, number of nonverbal students, AAC interventions implemented). The second set of questions was related to social validity. Teachers provided:

1)   Their opinions about their experience using tablet devices for AAC interventions.

2)   Observed the benefits of high-tech AAC devices.

3)   Noted the differences between tablet devices and other AAC methods.

4)   Possible difficulties encountered during the implementation process.

5)   The required actions to overcome these difficulties.

Other questions during the interview were about the type of instructional strategies the teachers implemented and students' independence in using iPads for communication. By the end of the interview, the participants were told that they would receive an email about the transcribed interview and asked to check to ensure the accuracy of the recording.

The researcher conducted direct classroom observations to detect the implementation process of tablet-based communication interventions and teachers' actions to overcome difficulties. The researcher collected data through observations to gain detailed descriptions of practitioners' attitudes toward high-tech AAC devices that were unexploited during the interviews. Each participant was observed for 30 to 60 minutes during instructional time (e.g., group and one-on-one sessions) through video conferences (e.g., FaceTime, Skype). The observations were conducted in multiple contexts to collect in-depth information about the issue. The total number of observational sessions that were performed was five sessions. The researcher took field notes about the teachers' implementation of tablet-based communication intervention (e.g., provide direction/questions, prompt responses, fade prompts, reinforce responses, provide opportunities to interact with using the device, use strategies to overcome technical difficulties, prompt peer interaction with the student, provide opportunities to generalize, collect progress data, and instruct operational skills). Also, teachers' interaction with the students who were using tablet-based devices for communication was documented through the observations. In addition to teachers' behaviors during instruction, paraprofessionals' and other students' actions were also noted. By the end of the observational session, the researcher asked the teachers questions to clarify the strategies they used during instructions.

2.4 Data Analysis

The collected data from the semi-structured interviews and the direct observations were analyzed by following an open-coding procedure (Strauss & Corbin, 1990). The researcher used NVivo 10 (the program used to analyze unstructured data) to organize the data into open codes. The researcher read the transcribed interviews and field notes line-by-line, highlighted the information, and created codes. Then, the researcher used axial coding to group the related open codes into different groups. For example, the axial code labeled benefits included different open codes: weight, portable, flexible, time-saving, customize, durable, and motivation. After grouping the open codes into groups, the researcher used selective coding to organize them into appropriate themes. For instance, the social

validity theme included three axial codes (e.g., attitude, benefits, and difficulties). In addition to coding, the researcher used the program to create models to demonstrate the axial code benefits and problems. The researcher used the SimpleMind application, which helped draw a model showing the relationships between themes, groups, and codes.

2.5 Trustworthiness

2.5.1 Credibility

The researcher established the credibility of the findings through prolonged engagement, persistent observation, and member checks. The researcher continued to collect ongoing data during the process of data collection by performing the following:

1) Asking questions after each observation session.

2) Emailing questions to teachers.

3) Conducting observations in different contexts to accurately understand the teachers' perspectives on tablet-based AAC intervention.

The researcher also spent enough time observing teachers in their classrooms (approximately 3 to 4 hours) to collect data about their reactions to implementing tablet devices for communication intervention. Regarding member checks, the researcher sent a transcribed interview to teachers. The teachers informed the researcher that the recorded responses to the questions asked during the interview were correct. Prolonged engagement, persistent observation, and member checks were used to establish credibility.

2.5.2 Transferability

Thick description and purposeful sampling were used to establish transferability. The researcher provided a detailed description of each case study. In addition, the researcher provided a dense and rich description of each theme in the result section. The researcher also described the process of recruiting the participants. During the observational sessions, the observer took a detailed description of the context to increase transferability. In addition to the thick description, purposeful sampling was also conducted. The researcher had set specific criteria for participants to be included in the study. This is to collect reliable and valid data about teachers' perspectives toward using iPads for communication.

2.5.3 Dependability

The researcher established dependability by referring to and quoting teachers' responses and observation notes. In the findings section, the researcher referred to specific parts of the interviews and the observation notes when presenting the themes and the codes. An audit trail was used to ensure that the results were accurate and dependable.

2.5.4 Conformability

The researcher had documented reflective journals during the study. The journal revealed what types of difficulties were faced while collecting data, what data surprised the researcher, and what data were supported by the literature. This method also helped to decrease the chances of bias in interpreting the results. The journal provided reasons behind the researcher's decisions during this process. The journal indicated what the researcher could have done to improve the study.

2.6 Context of the Researcher

The researcher, an associate professor and a board-certified behavior analyst-doctoral level (BCBA-D) had experience teaching students with ASD who used multiple communication methods (e.g., American Sign Language, gestures, picture cards, and computer-based devices) in the US. She worked on several projects related to individuals with ASD and tablet-based AAC devices. She published several studies and systematic reviews regarding AAC and verbal behavior in children with ASD. This study helped the researcher reach the following objectives: (1) enrich the literature by providing empirical results about high-tech communication devices and autism and (2) help connect researchers and practitioners by setting a guideline for parents and teachers to train their students/children on using tablet-based devices for effective communication. These were the objectives that the researcher met by conducting this study.

3. Results

The analysis process revealed that three main themes emerged from the interviews and the observations. The researcher used quotes directly from the interviews to support the findings. The selected quote under each theme was based on how the response powerfully revealed the teachers' point of view regarding using iPads for AAC

intervention. These themes were social validity, AAC intervention, and programming. There were also subcategories under each theme. Based on the research questions, the themes were presented from the most significant to the least.

3.1 Theme One: Social Validity

3.1.1 Attitude

The teachers had extensive experience using the iPad for communication and other purposes. One of the teachers, Mr. Eric, stated that he had experience teaching students using iPads for communication: "I have probably been using iPads for communication since 2012." Based on the teachers' answers to the interview questions, they both had positive experiences using the iPad in their classroom. Mr. Eric's response showed his positive perspective toward the iPad, "I think right now, the iPad is at the top of the line." The other teacher, Mr. Eric, shared the same attitude toward the iPad: "I have seen its benefits, and it is worth the effort and the time." Before using the iPad, the teachers had experience using multiple forms of AAC methods ranging from low-tech devices (i.e., communication books) to computer-based devices (e.g., Dynavox). Ms. John mentioned:

> *Most students have been trialed using many other forms of communication devices before they even get to the iPads. I know many of the students I have worked with before have used picture icons, PECS, or all of that before moving to the iPad. Other students used standard communication devices (e.g., Dynavox) before we tried the iPad.*

3.1.2 Benefits

Based on the teachers' views, iPads have several advantages over other AAC devices. The three significant benefits of using this device were flexibility, time-saving, and customizing. The teachers talked about how it was easy to change the iPad based on the users' needs and abilities. For example, Ms. John stated, "I think that the iPad is more versatile than other communication devices." The time teachers can save when programming and updating the vocabulary was another advantage teachers indicated from using the iPads. Mr. Eric explained how using the iPads saves time and effort.

> *The iPad cuts down the process from 7 to 3 steps, which is so beneficial. If you have a teachable moment with a student with autism spectrum disorder, you can get in there and reinforce them to use their words. I think that is what the iPad is great for. It is instant gratification. You can just put it [symbol] in there for less than a minute.*

The teachers also mentioned how programming and customizing the iPad was easy based on the students' characteristics. Indeed, the researcher observed how quickly the teacher could include a symbol on the iPad during one of the individualized teaching sessions. Ms. John explained how she customized the communication app on the iPad to match the students' deficits in fine motor skills.

> *One of my students right now has a lot of shaking and tremors, so it is really hard for him to select small icons. The iPad was a great fit for him because you can adjust the size of the icon to make it bigger.*

3.1.3 Barriers

The teachers encountered several difficulties when using iPads in their classrooms. One of the teacher's main barriers was that the students needed help separating the purpose of using the iPad for entertainment and education. Ms. John responded when asked to list the barriers:

> *Some of my students are used to using iPads at home for recreational use. So, it is sometimes challenging to separate the iPad as a communication device for recreation and watching videos.*

Mr. Eric also faced the same issue when he stated, "Then you run into an issue where the iPad is not for communication. It becomes more of a toy." Considering the iPad as a toy more than a communication device is a significant issue supported in the literature (McNaughton & Light, 2013). Mr. Eric indicated how he overcame this issue by limiting the student's access to the iPad for purposes other than communication. This feature was recently included in the iPad and has helped teachers tremendously. Mr. Eric explained the results of the lack of restricting the student's access to the edition buttons on the iPad:

> *But the only thing that I do not like about certain iPads, and this is before we learned how to lock them in using a code, is that one of the students that I have known the longest did not lock him in because we did not know how to do it. One day, he deleted his communication app; thankfully, he was able to sign.*

The student's inability to operate the iPad correctly due to their fine motor skill deficits was one of the barriers that the teachers mentioned in their interviews. Ms. John indicated that students would have problems accessing the iPad if they had tremors: "Some of them have trouble navigating the iPad with their fine motor difficulties in swipe and taping to access some of the things on the iPad." Teachers indicated that some parents they deal with restrict teachers' ability to change the iPad programming; Mr. Eric stated, "If you had a parent who does not want you to change it, like if you need to get permission first, that would be cumbersome."

Moreover, other barriers were discussed. The students' difficulty typing on the iPad was another barrier that the teachers faced, as stated by Ms. John: "Getting used to typing something in the iPad to get something that they want or ask for help." Another problem Ms. John mentioned that we recognized in AAC devices was abandonment. She noted that some students needed to be reminded to take their communication devices with them whenever they needed to go, "Some of the difficulties are related to getting the students to use to take the iPad everywhere they go." Teachers discussed in the interviews that the students' low level of symbolic understanding was another problem they faced when using the iPad. Ms. John mentioned, "Some students have trouble figuring out what the pictures on the iPads represent." The other difficulty the teachers discussed in the interview was their students' inability to comprehend the iPad's value; Ms. John stated, "They have difficulty understanding that when they use the iPad, they get something that they want at the beginning of the intervention phase."

3.2 Theme Two: AAC Intervention

3.2.1 Instructions

This subcategory focuses on revealing the types of instructional strategies teachers use to train their students on multipurpose handheld devices. One of the instructional strategies that both teachers used with their students was modeling. During one of the observation sessions with Ms. John, the researcher observed the teacher model to the student how to navigate through pages on the iPad and select the new word in the file designated to functional words. The student could choose the symbol without any help from the teacher. This session showed how the teacher used modeling when teaching a student a new task.

Least-to-most prompting (e.g., verbal, gesture, and physical) was another strategy that was noted to be employed in training AAC users. The researcher observed that Mr. Eric and Ms. John increased the intensity of prompting when the students needed help using the iPad successfully. When Ms. John was asked what types of instructional strategies that she used in her classroom, she responded that she used prompting:

> *I would say least to most prompting. When we first started, we would use a lot of hand-over-hand prompting and show them exactly where everything was and how to find it. We try to fad that quickly so they do not become dependable on it. But we also use a lot of one-on-one with the speech-language pathologist and me, as well as with their aids.*

3.2.2 Performance

One of the subjects that the researcher discussed with the teachers during the interviews was the students' current level of performance with using the iPad-based SGD. The researcher asked both teachers about the student's ability to use the iPad for various verbal behaviors (e.g., requesting, labeling, and answering questions). Requesting access to preferred items was reported to be a verbal skill that the students could perform independently. Ms. John talked about her students' ability to use the iPad for communication:

> *All three [requesting, labeling, and answering questions] if they use them independently. Because we practiced it in specific settings, they will request items they need or answer questions in our morning meeting because it is their routine now, and they have become accustomed to it. But if they are using it more independently, they would use the iPad to request what they want.*

The students' ability to use the iPad for independent communication was detected during the observation sessions. During one-on-one sessions with Ms. John, the observed student sometimes showed the ability to use the iPad for communication successfully. The teacher and the student were sitting in an isolated area in the classroom—the teacher reviewed the safety words using the iPad and visual cue (list of words). The teacher asked the student to locate the words on the list and the iPad. The teacher offered the student an edible reinforcer and rejected the candy using the iPad independently. "I do not want chocolate." The researcher also observed one-on-one sessions with Mr. Eric. The student was diagnosed with hearing impairment, so the teacher used signs and the iPad as communication methods. Throughout the session, the student answered the teacher's questions, asked questions, and requested items (e.g., I want candy, I want paper towel).

3.3 Theme Three: Programming

3.3.1 Process

Programming the AAC device based on the user's characteristics and keeping the vocabulary current is the key to effectively implementing the AAC intervention. The researcher asked the interviewees about the programming process and the person responsible for updating the AAC device. Ms. John said, "I do all the programming, and the aids are in the classroom. So, we do a lot of adding icons on the device ourselves with the help from the speech-language pathologist." While Ms. John and her aids keep the vocabulary up to date, Mr. Eric answered when asked about the person responsible for the programming, "I put more on the speech-language therapist." The frequency with which teachers and speech pathologists program the iPad makes the device functional. Ms. John mentioned, "We usually try to do it at least twice a month. And if we are lucky, once a month." Mr. Eric said, on the other hand, "If we see something that they need, we will add it." Restoring the program was one of the strategies used as a backup plan in case the device crashed down. This strategy helped make sure the students had their devices when needed.

3.3.2 Strategies to Overcome Difficulties

Teachers perform specific strategies to overcome difficulties when dealing with students using iPads for communication. During group instructions, the researcher noted that the students did not have a cloudy symbol on their iPads. Therefore, the teachers asked the students to select the cloud symbol instead of cloudy. Choosing a symbol that is similar to another symbol was one strategy that teachers used. Another strategy was adding the desired symbol on site on the iPad. The researcher observed the teacher adding a symbol of the word "boys" during one-on-one teaching sessions. The time that took the teacher to add and introduce the symbol to the students was less than 2 minutes. This helped support the iPad in saving time and effort as an AAC device. Teachers were restricting students' access to editing features and other apps to limit the iPad's use for communication. The teachers showed positive attitudes toward this feature; Ms. John said, "But I like the locking mechanism on the iPad. So, when you get them to the communication system, you can lock access to apps so it is strictly used for communication." To implement the AAC intervention effectively, the teachers ensured the iPads were available to the students at different times. Ms. John stated in her response about making the iPads available to her students, "We have them take their iPads with them everywhere. So, if they need anything or we think that they will need or want anything, they also have their iPads right there in front of them."

4. Discussion

This study used a qualitative approach to determine practitioners' perspectives about their nonverbal students with ASD using tablet-based AAC devices for communication and investigate the barriers they faced during the implementation process. The participants recruited for this study were two special education teachers. The researcher used semi-structured interviews and natural observations as data collection methods. The interview focused on revealing the effectiveness of the iPad as a communication device, the benefits of using the device, the programming process, and the difficulties of using the device. The researcher aimed to observe teaching sessions in different contexts (e.g., group instruction and one-on-one sessions). The researcher focused on recording the teachers' strategies to use the iPads, the students' performance in using the device for communication, and the teachers' actions to overcome difficulties during instructions.

The results of the interviews and the observations helped answer the first research question: what are teachers' perspectives on the effectiveness of tablet-based AAC intervention on students with ASD? The teachers had extensive experience utilizing iPads as a classroom communication intervention. Based on their experience with this particular device, tablet-based AAC devices are practical tools that help improve the students' communication skills, consistent with other studies' results (e.g., King, Brady, & Voreis, 2017). When the teachers were asked to compare the iPads and PECS, they preferred the iPads to other AAC methods. A recent study by Yong, Dutt, Chen, and Yeong (2021) compared the acquisition, preference, and discrimination in requesting skills between picture exchange and the iPad-based SGD, and the results demonstrated the iPad was superior to the other AAC method. Teachers also showed their preference for a particular AAC app. During the interview, the teachers explained their experience using two AAC apps (Sono Flex and Proloquo2Go) in the trial process. They preferred using Proloquo2Go rather than other AAC apps. The features of this app might be the factor that led teachers to prefer using Proloquo2Go (Alliano et al., 2012; Bradshaw, 2013; Lambright, 2023; Sennott & Bowker, 2009). It can be inferred from the interviews and the observations that the teachers have a positive attitude toward utilizing iPads as a communication device. Multiple studies have presented that stakeholders (e.g., parents and practitioners) expressed positive perspectives on using this touch screen device as an AAC system (Clark et al., 2015; King et al., 2017).

The researcher can also see teachers' positive perspectives toward iPads when they discuss the possible benefits of using the device. Teachers like to use iPads more than other devices because they save time during the programming process. Based on the interview and the observations, it was faster and easier to modify the device (add/delete a symbol) when needed during instructional time. In addition to feasibility, teachers mentioned other benefits, such as transferability, availability, and flexibility. The literature acknowledges these benefits (Farrall, 2013; Johnson, 2013; Johnson, Inglebret, Jones, & Ray, 2006). To answer the first research question, practitioners have a positive perspective toward using iPads as AAC systems.

When teachers were asked to list the barriers they faced when utilizing iPads as AAC systems in their classroom, they mentioned several aspects of the device they did not like. One of the problems that the teachers talked about extensively was having students whose perspective toward the iPads as an entertainment tool. McNaughton and Light (2013) discussed in their article the perspective of these devices as entertainment tools, which is one of the challenges of using touch screen tools. To overcome this problem, teachers stated that limiting their students' access to other programs was an effective strategy. The teachers also discussed the difficulties some of their students with deficits in fine motor skills faced when operating the iPads. Despite the iPad's various advantages, this device has a sensitive touch screen that does not support users with tremors or weak fine motor skills. Kagohara et al. (2010) conducted a case study about improving the use of an iPod-based AAC device by a teenager with ASD and fine motor skills deficits. The study showed that using systematic instructions (e.g., differential reinforcements, delayed prompts, and least-to-most prompts), the participant was more accurate when operating the device. Another challenge the teachers encountered when using handheld multipurpose devices was that the students sometimes needed to remember to use the device for communication. Abandonment issues and AAC devices are a well-acknowledged problem in the field (Johnson et al., 2006; Moorcroft, Allum, & Scarinci, 2022). Teachers mentioned in the interview that their strategy to overcome this problem was to make iPads available to students throughout the school day. The teachers mentioned other barriers related to unsupportive parents, difficulty typing words/phrases on the iPad, and lack of valuability.

Other themes were developed from the interviews and the observations. The researcher asked the teachers to discuss the instructional strategies they used to train their students to use the iPad for communication. The teachers explained that they were using modeling and least-to-most prompting (e.g., verbal, gesture, and physical) to help their students acquire the device's operational skills. The researcher observed the teachers using both strategies when instructing the students in group and one-on-one instructional sessions. The literature showed that these two instructional strategies effectively trained students to use AAC devices (Flores et al., 2012).

Regarding the students' performance, the researcher noticed that the students could use the iPad independently to request items or actions. However, they needed to be prompted when they were asked to label items or answer questions. This was consistent with the teachers' responses about their students' performance during the interview. Most of the students showed that they rely heavily on prompts to use the iPad for communication.

4.1 Implications

The study's results indicated that teachers had positive attitudes toward using iPads as an AAC system. The findings would have an impact on practitioners who are dealing with nonverbal students with disabilities. Practitioners would benefit from this study by revealing essential aspects of the iPads as SGDs. One of the most significant aspects is that iPads are effective devices for communication by nonverbal individuals with ASD. Teachers can also conclude from the findings that systematic instructions help these individuals acquire the competencies to operate the iPads independently. Demonstrating the possible benefits of using iPads for communication might influence the decision-making process of the AAC team. Teachers might suggest using tablets for the team after realizing how these devices match their students' needs and characteristics. Practitioners might benefit from this study by presenting problems that teachers faced with utilizing iPads for communication and what strategies they took to overcome these problems. This study might encourage professionals to consider using tablets as AAC devices by demonstrating the positive experience that the participants have from using these devices.

4.2 Recommendations for Future Research

Even though this study showed the positive effects of tablet-based AAC devices, subsequent studies should expand the scope of social validity and AAC methods. Future researchers should consider including teachers serving students with other developmental disabilities (e.g., Down syndrome). They might have different perspectives about using these novel devices for communication. Also, researchers should investigate the attitudes of practitioners instructing students at the primary school level. Dealing with students at a young age might be a factor that influences practitioners' views of these devices.

Further research is recommended to include more practitioners to help understand this phenomenon. Teachers are part of the AAC team. Therefore, the perspective of another team member (e.g., speech-language pathologists, parents, and students) is also essential to be determined. iDevices are primarily used in the literature as an AAC method. Thus, researchers are encouraged to examine the social validity of tablet devices operating on another system (e.g., Android). This study focused on teachers' attitudes toward using iPads for communication. Future studies should determine practitioners' perspectives on using this device for other purposes (e.g., education, vocation, and functional skills).

4.3 Conclusion

The results of this study indicated that special education teachers had positive perspectives about using iPads for communication. They stated that the iPads helped improve their students' verbal behaviors. However, practitioners experienced several difficulties operating tablet-based AAC methods in their classrooms. They also discussed the strategies that they had used to overcome these barriers. The study might benefit teachers who are currently instructing nonverbal students with disabilities, especially by presenting participants' experiences and how they solved some of the problems that they faced. Further studies should consider expanding the scope of this study by investigating parents' and speech pathologists' perspectives on using iPads as SGDs.

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