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Using technology for communication with selective mutism

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USING TECHNOLOGY FOR COMMUNICATION WITH SELECTIVE MUTISM

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Dedication

I *would like to dedicate this thesis to my husband, Alex, my parents, Thomas and Donna, my sister, Nicole, and my close friends and family, that gave me the strength to proceed and who believed in me every step of the way.*

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I would like to express my appreciation to Dr. S. Jay Kuder for believing in my vision, allowing me to follow my passion, and guiding me through every step of the process. I would also like to acknowledge the family of my subject who accepted me into their lives, gave up their personal time, and allowed me to work with their son.

Abstract

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The purpose of this study was to examine everyday assistive technology, such as an iPad® and the effect that it would have on the communication of a fifth grade student with Selective Mutism. The subject was introduced to the iPad® with the purpose of a verbal communication application creating success for the future. The application was used to increase nonverbal communication with peers, teachers, and school staff by way of sharing speech through the voice of the application. In the study it was also examined to see if the communication application could create a verbal opportunity for the subject to speak with trusted individuals. The results suggested that the iPad® application created success for nonverbal communication within the classroom, however due to time constraints, the application was not able to generalize into speech communication from the subject.

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Chapter 1

Introduction

Selective mutism, also known as elective mutism, is a disorder that can affect children and adults of any age. Selective mutism was added to the Diagnostic and Statistical Manual of Mental Disorder (DSM) third edition in 1980. The DSM has defined selective mutism as "a disorder in which a child does not speak in specific social situations in which speech is expected (for example: school, with playmates) but speaks formally in other situations" (Hung, Spencer, Dronamraju, 2012).

Lang et al., states that less than 1% of the population is diagnosed with selective mutism, meaning the prevalence of the disorder remains low. Hung et al. (2012) feel that the documented occurrences of selective mutism are miscalculated due to the fact that students with selective mutism usually are not behavior problems in the classroom and have a tendency to not attract other's attention. Often the symptoms can be undiagnosed for several years until such a time that the child has started attending school. Elementary school teachers tend to be the school professional that will identify that there is a problem. The Diagnostic and Statistical Manual (DSM-V) states that the symptoms of selective mutism need to be present for at least one month after the first month of school. Hung, Spencer, and Dronamraju (2012) hypothesize that this is so because when children are placed in a new situation there is a length of time needed for adjustment. After one month plus of non-speaking communication, interventions need to be taken.

Symptoms of selective mutism usually occur between the ages of three and five. Hung, Spencer, and Dronamraju (2012) state that the presenting symptoms of

selective mutism can sometimes be confused with Autism Spectrum Disorder or developmental delays due to the lack of interaction with their peers and other people. It is important to understand that the presence of a diagnosis in communication disorders should not mask or out rule the potential diagnosis of selective mutism. The causes for selective mutism include family background, a traumatic experience presented early on in the childhood of the student, injury to the mouth of the child, and possible family secrets. That being said, the psychological symptoms and affects of these reliably silent children are far more involved than can be supported by a speech diagnosis alone. Giddan et al., 1997, states that according to the Diagnostic and Statistical Manual of Mental Disorders, the child's failure to speak is not due to their incapability for or ignorance of, but of their comfort level in that particular social situation (Giddan, Ross, Sechler, Becker, 1997, p. 128).

It is very common for children with selective mutism to be comfortable with speaking at home, however, the anxiety of speaking at school creates the selective mutism situation. Subsequently parents tend to blame the school for their child's disability. In turn, schoolteachers and school personnel tend to be hesitant about drawing attention to the situation for fear of hostile parents. A snowball effect is created in which the student is then not receiving the assistance that he or she needs and unfortunately the longer the symptoms occur, the more difficult it is to reverse the problem (Hung, Spencer, & Dronamraju, 2012, p. 223).

Currently, in a self contained Special Education class, there is a young boy who has been selectively mute for over 5 years. It was he, which ignited the purpose of his

study, and to try helping children with this disorder. After completing some research, it was discovered that a common misconception about selective mutism is that it is thought that the children will simply "outgrow" its symptoms. This reportedly is not the case and due to this children tend to be underreported and early intervention is not sought for these struggling children (Hung, Spencer, and Dronamraju, 2012, p. 223). As the selective mutism disorder lingers, other issues could begin to form and coexist into adulthood. Therefore, the purpose of this study is to examine whether the use of technology such as an iPad®, plus using a communication application, will enable a child with selective mutism to increase the frequency of his communicative interaction with others. In addition, it is hoped that, by engaging in additional interaction, the child may begin to use his own voice.

Research Problem

The questions to be answered in this study include:

1. Can assistive technology, such as an iPad®, increase the communicative interaction in a child with selective mutism?
2. Can assistive technology, such as an iPad®, increase verbal communication in the school setting with peers, teachers, and staff?

Single subject research will be conducted on an eleven-year-old boy with selective mutism in an urban school district. He has been selectively mute for approximately five years, but has recently made break through progress with privately eating and using the bathroom in school. It is hypothesized that this student will increase his social interactions. It is also hypothesized that his use of spoken language will increase in a private setting with the teacher. The

measurement tool used will be linked to the lunchroom to attempt include interactions with others such as the lunchroom staff and teachers. It is anticipated that the subject will be able order his lunch privately to the classroom teacher at first using the iPad® application, and then verbally requesting an item from the menu. It is hypothesized that the student will start off saying "thank you" to the lunch staff using the iPad® application, then eventually moving forward to verbally thank the lunchroom staff for their services. Data will be collected in a chart to keep track of the amount of time the student will use the application and how often he will speak verbally.

Key Terms

Selective mutism- a disorder in which a child does not speak in specific social situations in which speech is expected (for example, school, with playmates) but speaks normally in other situations (Hung, Spencer, & Dronamraju, 2012, p. 222)

Communication- the process participants use to exchange information and ideas, needs and desires (Kuder, 2013, p. 403)

Diagnostic and Statistical Manual of Mental Disorders (DSM)- The Diagnostic and Statistical Manual of Mental Disorders (DSM) is the standard classification of mental disorders used by mental health professionals in the United States. It is intended to be applicable in a wide array of contexts and used by clinicians and researchers of many different orientations (e.g., biological, psychodynamic, cognitive, behavioral, interpersonal, family/systems). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) is the current edition and has been designed for use across clinical settings (inpatient, outpatient, partial hospital, consultation-

liaison, clinic, private practice, and primary care), with community populations. It can be used by a wide range of health and mental health professionals, including psychiatrists and other physicians, psychologists, social workers, nurses, occupational and rehabilitation therapists, and counselors. It is also a necessary tool for collecting and communicating accurate public health statistics. The DSM consists of three major components: the diagnostic classification, the diagnostic criteria sets, and the descriptive text. (American Psychiatric Association, 2012)

Interventions- intensive instruction usually delivered after a period of time in which the individual has been exposed to instruction (Kuder, 2013, p. 405)

Implications

Speech is a very important part of communication. Students that are diagnosed with selective mutism can be negatively affected socially and emotionally throughout their development in life (Hung, Spencer, & Dronamraju, 2012, p. 222). The lack of verbal communication from students with selective mutism also can create difficulties academically due to the fact that teachers have trouble assessing the student's needs and academic levels. If communication were increased, the student's social, emotional, and academic aspects of life would be positively impacted.

Summary

This study will examine whether assistive technology, such as an iPad®, can help increase communication and spoken language, in a school setting for a student with selective mutism. It is hypothesized that the iPad® will help a completely nonverbal student to increase his communication using an iPad® application that

will use text to speech software. It is further hypothesized that the iPad®, will help the student begin to speak in private situations. If successful, these results will create a positive impact on the student socially, emotionally, and academically in a school setting.

Chapter 2

Review of Literature

Although only effecting about 1% of the population (Lang et al., 2011, p. 623), selective mutism has been impacting the lives of children and adults for years. Hesselman in 1983 and the DSM fourth edition changed its name from "elective" mutism to "selective" mutism to indicate that the child "selects" the social situations in which he or she does not speak (Giddan, Ross, Sechler, & Becker, 1997, p.128; Hung, Spencer, & Dronamraju, 2012, p. 222). No matter the name, these children are experiencing a social disorder that is counterproductive to living a full life.

Selective mutism is typically found in more girls than boys at a young age, which is unlike many of the childhood disorders (Crundwell, 2006, p.49). Beare, Trogerson, and Creviston (2008) discussed a study conducted by Black and Uhde (1995) that discovered that 97% of children exhibiting selective mutism symptoms were also diagnosed with social phobia. Furthermore, out of forty-one adults that were diagnosed with selective mutism, 60% of those adults continued to struggle in their adulthood with "self- confidence, independence, achievement, and social communication." (Beare, Trogerson and Creviston, 2008). Nonetheless, it is important for teachers to realize that students or adults experiencing selective mutism are not unsociable, and generally yearn to interact with their peers.

Personal experience shows the difficulties that link to the assessment of skills with a student with selective mutism. Giddan, Ross, Sechler, and Becker (1997) state, "mutism poses limitations on the teacher and other professionals with regard to their ability to assess the child's skills and intellectual development.

Counterproductively, the academic environment accommodates to the child and unintentionally supports the behavior." Crundwell (2006) discusses that in a previous study it was found that nearly one third of the student population with selective mutism fall below grade level in their academics. Additionally, classroom teachers have informally assessed that children experiencing selective mutism fall deficiently not only in the areas of academics, but also in the area of overall functioning skills (Crundwell, 2006, p.50).

Research has found that approximately 46% of the students exhibiting selective mutism can improve when proper behavioral interventions and timelines are used (Richburg & Cobia, 1994, p.2). Some guidelines to follow for management of the selective mutism disorder are as follows:

1. Once a child has been silent in school for at least 2 months, an intervention by the speech and language pathologist, teacher, and parents must be initiated. This intervention must go on for at least 2 months.
2. If progress is being made with speech the intervention will continue as decided until child has created success in the classroom or trouble area.
3. If no speech has been acquired the team needs to initiate a mental health diagnosis from a professional in an attempt to expand the treatment to create success for the child.
4. If some speech is established a generalization of that speech is to be extended into the school and community settings.

5. If no speech is established the team of professionals need to accrue more intensive interventions.

The above are just guidelines to intervention. It is impossible to predict the length of time needed for an intervention due to factors such as how long the behavior has been exhibited for, the personality of the child, and the willingness of family members and significant others, who are present in the students environment, to participate in the intervention (Giddan, Ross, Sechler, Becker, 1997, p.132).

When deciding on an intervention plan it is important for therapists and other professionals to use the resources that they have available to them to get to know the student. It is helpful for the team to know the child's likes and dislikes, favorite and least favorite places, and rewards. Creating an intervention plan that is specific to your student will help create a successful strategy to produce the best results (Hung, Spencer, and Dronamraju, 2012, p.227-228).

Therapists suggest following a progression of therapeutic interventions to create the least stressful environment possible for the students. Therapists recommend gaining a rapport with the student. A trusting relationship will allow the therapist to be able to increase demands, and include multiple sites for interventions. The therapist should maintain a close, empathetic relationship with the patient that is full of frequent daily rewards and varying interventions. Allowing the child to choose the behaviors that he or she would like to work on that day will keep things interesting, and being creative when interventions get stale, is necessary for success (Giddan, Ross, Sechler, Becker, 1997, p.130).

Once the above is established therapists can work on a progression towards vocalization. Giddan et al., (1997) has noted that therapists will see a development starting off with written messages and nonverbal gestures, such as head nods. Then the evolving student may allow for their reading of stories or conversations be tape recorded for others to listen to. Next, whispering might occur to trusted people in a safe environment, such as therapist, trusted peers, teachers, or during a puppet show. The whisper will hopefully transfer to a loud whisper and vocalization sounds, such as coughs, animal sounds, or musical instruments such as a harmonica or kazoo, would be used. A specific intervention needs to be put into place to help generalize these behaviors to sites outside of the trusted private room. Once generalization of these actions have occurred an expectation of a soft voice inside all school situations and finally, a full voice inside and outside of school is anticipated (Giddan, Ross, Sechler, Becker, 1997, p.131).

Selective mutism can be a frustrating disorder to treat. Often the task can be drawn out through months or even years. Selective mutism can often be resistant to treatment or the student's behavior might be misinterpreted as stubborn, shy, or unsociable. It is important to express sincere patience with these students because inadequate responses could unintentionally contribute to greater rooting of the selective mutism behavior (Harwood & Bork, 2011, p138).

Creating situations where talking is downplayed can help create a less anxious situation for students with selective mutism (Harwood & Bork, 2011, p138). It is important to try to minimize pressure towards speaking, and build confidence in the student's attempts to try to verbally communicate. The therapist should be

sure to keep the praise low key and systematic. Immediate rewards, and avoiding big celebrations will create a less stressful situation for the student. Building trust and allowing whispering will help build assurance to the student that you are there to help them (Hung, Spencer, Dronamraju, 2012, p. 228).

All of the above are considered suggestions to dealing with a student with selective mutism, however when it comes to therapists, these professionals have been trained to use specific research based interventions that have been proven to work on students with selective mutism, as well as, Autism Spectrum Disorder and non-verbal children. The interventions used are: contingency management, stimulus fading, response cost, systematic desensitization, shaping, role-play and video self-modeling (VSM), multimodal approach, and Augmentative and Alternative Communication (AAC) devices such as PECS, VOCA, and technology. Exploration of each of these interventions in depth, with specialization in the AAC area will be considered in the rest of this chapter.

Intervention Strategies

Contingency management. Contingency management is one data driven, research based intervention used for nonverbal children and children experiencing selective mutism. Contingency management, as with most of the interventions, uses a reward system to reinforce verbal behavior. The reinforcement is "contingent" upon the verbal response from the student. If the student verbally responds to a prompt, a tangible reinforcement such as, bubbles, money, candy, toys, crayons, or a reward of the student's choice will be given immediately. If nonverbal behavior is exhibited no reward is given in an attempt to extinguish the nonverbal response.

Careful monitoring of the verbal response is used, and data is collected to determine the effectiveness of the intervention on the nonverbal student (Richburg & Cobia, 1994, p. 2). If success is not achieved with this intervention it is encouraged to try alternate forms to achieve feat.

Stimulus fading. Stimulus fading is also called the "sliding-in technique" (Hung, Spencer, and Dronamraju, 2012, p. 223). It is used in conjunction with positive reinforcements to generalize the learned verbalized behavior. Stimulus fading can be used in two ways, with setting, and with persons. In stimulus fading with the setting, the child and a person that he or she is comfortable with are gradually moved from an environment that they are comfortable talking in, to an environment of higher stress. In stimulus fading with persons, a child and a person that they feel comfortable speaking to are placed in a comfortable environment for the child. Gradually more people are added to the environment one at a time. Fading needs to be done slowly and careful monitoring needs to be used. If fading is used too quickly it can lead to failure and can prolong an already lengthy process. The basic strategy of stimulus fading is to generalize and transfer speech from different locations, people, and activities. Stimulus fading has been proven effective when used with desired reinforcements and proper timing (Crundwell, 2006, p. 52; Hung, Spencer, & Dronamraju, 2012, p223; Richburg & Cobia, 1994, p.2).

Response initiation procedures. Response initiation procedures are used with selectively mute children to initiate speech. Response initiation procedures are used when the person with whom the child trusts and feels comfortable speaking around is not present. In this case verbal responses are attempted in a controlled

environment. Response initiation procedures have been proven effective and are broken down into shaping, response cost, escape or avoidance procedures, and reinforcement sampling (Richburg & Cobia, 1994, p.2).

Shaping. Shaping is the most frequently used response initiation procedure for nonverbal students and students with selective mutism. When using shaping, the phrase "vocalization ladder" is used to insinuate that the child is working towards fully speaking. The child is first asked to respond nonverbally. Reinforcement is given for the nonverbal response. Next the student will be asked to make certain sounds, such as a cough, sneeze, animal noise, or whistle. Moving onto a whisper or at least speaking one word is expected next then finally spoken words or sentences. Positive reinforcement is given for each step that is achieved on the "vocalization ladder" (Crundwell, 2006, p. 52; Hung, Spencer, & Dronamraju, 2012, p223; Richburg & Cobia, 1994, p.2).

Response cost. Therapists using response cost will give students with selective mutism a list of desired verbal prompts. Simple verbal prompts such as "thank you" and "please" are normally used, as well as familiar word lists such as the student's spelling list can be used. The therapist will set a timer and when the timer goes off the student is required to verbally communicate one of the responses off the approved list. The student is requested and expected to say these words in their "normal" speaking voice. If the term is used a reward is given to the child for their efforts. If the child does not respond to the questions of prompts a token or reward is removed from the student. Noncompliance of speaking has "cost" the student a reward. Response cost is always combined with positive reinforcements to increase

desired behavior (Giddan, Ross, Sechler, & Becker, 1997, p.130; Richburg & Cobia, 1994, p.2-3).

Escape or avoidance technique. Escape or avoidance technique is used in a controlled setting with a trained professional.. When a student with selective mutism is chosen to use the escape avoidance technique he or she is first sent for a psychiatric evaluation. The student's parents are informed of all the procedures and a short therapy session is given with the child to form a trusting rapport with the psychologist. The student is told that he or she is going to be required to talk. The child spends majority of the day with the therapist, usually one to two hours, or as long as it is needed for the child to verbalize. It is documented that the average time it takes for the child to speak is no longer than four hours. It is required in this technique that the child speaks at least one word to the therapist before leaving the office. This technique tends to evoke anxiety to the student but once verbalization has occurred the student receives praise, a tangible reward, and is reunited with their family (Giddan, Ross, Sechler, & Becker, 1997, p.129; Richburg & Cobia, 1994, p.2).

Reinforcement sampling. Reinforcement sampling is used as the last response initiation procedure. In order to complete a successful reinforcement sampling it needs to be combined with stimulus fading. Within reinforcement sampling the student is asked to choose their tangible reinforcement first, and the student is allowed to play with this reinforcement prior to earning it. It is explained that the student will now earn this reinforcement by speaking. After achievement of the reinforcement, stimulus fading is used to replace the tangible reward with

verbal praise. Generalization of the behavior is expected, through stimulus fading, before reinforcement sampling is used. Reinforcement sampling should be used in a controlled environment, with approved persons by the student. Reinforcement sampling should be used once the student is progressing with generalization and earning consistently through positive reinforcement (Richburg & Cobia, 1994, p. 3).

Systematic desensitization. Systematic desensitization is another intervention approach that is used by professionals to help treat student with selective mutism. Systematic desensitization is also known as "graduated exposure therapy." This technique is used to help students with selective mutism to overcome their fear and anxiety that they exhibit when there is an attempt to verbalize. Small steps are used to bring the student "gradually" into situations that make them uncomfortable. As the individual learns to cope with one stressful situation, a baby step is taken to overcome their next fear. Allowing the students time to work through their fear gives the student a feeling of self-reliance and confidence. Eventually, once exposures to all situations that are stress provoking to the student are attained, it is hoped that this technique will extinguish the student's anxiety (Hung, Spencer, & Dronamraju, 2012, p.223).

Role-playing and video self-monitoring. Role-playing is often used to help improve social skills in students with intellectual disabilities; however, it could prove to be helpful with students with selective mutism. Role-playing involves practicing the desired behavior, such as verbal communication, and then receiving feedback and reinforcement. Role-play could be used as a distractor for verbal

communication, such as the use of a puppet. Often times when a student is role-playing the feeling of anxiety is alleviated due to the casual nature of the activity.

Video self-monitoring can be used in conjunction with role-playing. Video self-monitoring is simply when the student and teacher video tape their role-playing scenario and then watch the tape back together. This allows the student to see the verbal praise given to the student, and allows him or her to see that he or she is successful at verbally communicating. The teacher and student monitor or point out the proper communication techniques that were used in the video to reinforce the positive target behavior. According to research it has proved to be an effective intervention to improve social and communication skills of children with emotional disabilities, autism spectrum disorder and behavioral disorders. McCoy and Hermansen, 2007 hypothesize that the combination of both role-playing and video self-monitoring it is likely to improve the communication of students with selective mutism (Lang, Regester, Mulloy, Rispoli, & Botout, 2011, p.623-624).

Reinforcement with systematic fading of prompts. Reinforcement with systematic fading of prompts is used to create a more self-reliant student when working with selective mutism. The student is asked to choose a reinforcement that he or she will be working towards. The student is then told that he or she is to verbally respond to questions with a voice that is loud enough to be heard, without struggling, a designated number of times. The student is informed that he is only allowed to receive a chosen number of reminder prompts in order to receive his reward. If the student accomplishes the task of loud verbal response within the chosen number of reminder prompts, a reward is given. Once success is achieved in

a response session, the number of reminder prompts is decreased to encourage self-reliance and self-monitoring. The same reinforcement system is applied while using the decreased number of reminder prompts. This intervention is continued as the teacher systematically fades out her use of reminder prompts. The student will continue to see success as he continues to receive reinforcements for the decreased number of reminder prompts in a data collection period. (Beare, Torgerson, & Creviston, 2008, p. 251)

Medication. Medication is an option for students with selective mutism. The severity, duration, and resistance of the episodes are a determinant in the student's eligibility for medication. The purpose of the medication is to act as an antidepressant or anti-anxiety for the student that is finding it difficult to speak. As with all medications the FDA has issued warnings of side effects such as suicidal thoughts and major depression. If a student is put on medication he or she should be closely monitored by their family doctor and parents should be made aware of any possible side effects. Medication is found to be most successful when it is used in conjunction with other interventions that are stated above (Hung, Spencer, & Dronamraju, 2012, p.224).

Multimodal Approach. Multimodal approach is one of the last methodologies to be discussed before diving into Augmentative and Alternative Communication devices. Multimodal approach is the term used for applying one or more of the above interventions. Multimodal treatments are found to be very successful in treating students with selective mutism. The combinations of psychodynamic and behavioral interventions have created success for students. An

example of a multimodal approach could include medication with a behavioral intervention, such as response cost. It is important to combine interventions because family, teachers, and specialists all need to work together to help create and maintain the speaking behaviors across all types of settings for the child. Multiple successful combinations of interventions leaves wiggle room for each responsible party to use what is most convenient and successful during that current situation (Hung, Spencer, & Dronamraju, 2012, p.224).

Alternate Interventions

Augmentative and alternative communication devices (AAC).

Augmentative and Alternative Communication devices (AAC) are educational materials that are used to level the playing field for students with communication needs. AAC can be used to bridge the gap between a student's strengths and weaknesses and the demands that the educational community is putting on these children. AAC helps students with communication difficulties compensate for limitations that might otherwise hinder their educational experience. These devices can help strengthen a child's functional communication capabilities, such as requesting lunch or using the bathroom. The goal of AAC is also to increase the student's participation socially in activities around the school, home, and community (Douglas, Wojcik, & Thompson, 2012, p.60).

The AAC intervention is used to enable the child's current speech capabilities. AAC's use of multiple communication modalities help to trigger their "natural supplementing (augmentative) or replacing their natural speech (alternative)" (Schlosser & Wendth, 2008, p. 212). Research has shown that the use

of AAC might actually trigger the use of speech in students with communication difficulties, but most professionals fear the hindrance of the natural speech due to the use of the AAC device. Currently there is no research supporting the obstruction of speech due to the use of AAC devices (Sclosser & Wendth, 2008, p. 227). In fact, in Schlosser & Wendt (2008) reported that none of their 27 participants decreased in speech production and 89% of their participants actually showed an increase in speech production by the end of their six studies.

The most well known forms of AAC devices are Picture Exchange Communication System (PECS) and Voice Output Communication Aids (VOCAs). However, recently in the past five to seven years there has been a severe increase in mobile technology devices, such as tablets and smartphones, to be used as an AAC device. In 2010, Tentori and Hayes reported the first smartphone application that was used for children with communication difficulties. This application was used to help the students with socials cues within specific social situations (Mintz, 2013, p.18).

Mintz (2008) found that the mobile technology, being used as an AAC device, often had more credibility than the classroom teacher. He felt that this was the case because when prompts are coming from a human being they can tend to be overwhelming and over stimulating to a child with communication anxiety or difficulties. The mobile technology allows the child to be in control of the prompts, which avoids overload. The use of these devices creates a feeling of self-determination when the reward or received message comes from a device. The student creates a feeling of ownership for the reward he has received, due to the

direct correlation of "touch the device, receive reward"(Mintz, 2008, p. 24). For students with selective mutism, this could help remove the direct request or "nagging" that comes from the teacher to communicate. It can create a more low key situation that motivates the child to want to communicate, as opposed to being "forced" to communicate.

Current options, such as mobile technology, can be very appealing for student with communication difficulties. It is important that in order for these AAC devices to provide the most efficient support possible the students must be taught how to access and use their devices effectively and efficiently. These AAC devices can be an effective way for students to compensate for their limitations. It is important to not allow the students' skill deficits to limit their opportunities that and AAC device can create (Douglas, Wojcik, & Thompson, 2012, p.59-60). Instead, a view at the student's strengths could help a professional better choose a device for the struggling student.

There are many options out there that can be used as an Augmentative and Assistive Communication device. The three that will be discussed today are the PECS, VOCAS, and the mobile technology realm of AAC.

Picture exchange communication system (PECS). The Picture Exchange Communication System (PECS) is made up of six phases. The system is used as a communication tool for nonverbal students. The students are required to exchange a picture for a tangible reinforce. For example, the student is required to show the picture of the scissors when he or she wants a pair of scissors. The student will be given the scissors and a positive reinforcement to enforce the behavior. As the

student continues through the phases, he or she will be required to exchange the pictures for items from a distance, and then eventually add into sentence starter strips of "I want" (Bock, Stoner, Beck, Hanley, & Prochnow, 2005, p. 264).

Voice output communication aid (VOCA's). The Voice Output Communication Aid is one of the more sophisticated forms of Augmentative and Alternative Communication devices. VOCA's are often used for students with complex communication needs, and also works well for students with Autism Spectrum Disorder (Beck, Stoner, Bock, 2008, p.198).

A VOCA is a lightweight, digitized Augmentative Alternative Communication device that assists in natural interactive speech and can increase socialization by way of a speech output system. GoTalk is one of the digital programs that are normally used with a VOCA system. By the simple touch of a button, which is categorized by a picture or word, a sequence of speech can be formed for the student using the device. The learning curve for a VOCA device is rather simple, which creates a relatively quick and easy transition into real life use (Beck, Stoner, Bock, 2008). However, the VOCA machine itself tends to be on the larger scale, in the way of appearance, which can make a student stand out or may be a little difficult for a smaller child to handle. Currently, another form of Augmentative Alternative Communication Device that can replace VOCA is the iPad®.

iPad® or tablet technology. Todays' technological advances that have occurred with portable computerized technology have created situations where an AAC device can be available to anyone in need. Many applications can be purchased or even downloaded for free to any iPad®, iPhone®, portable tablet device, or smart

phones. It is not uncommon to see children of all ages without smartphones, iPad®, or other tablets in their presence at all times. For a student needing an AAC device the iPad® or tablet can create a situation where he or she can use applications on the devices for communication without standing out.

Another pro is that one single mobile device can handle multiple applications so it is not necessary for the student to juggle more than one AAC device. Not only can these mobile devices be used for communication, but also it can be used for pictorial schedules, free time rewards, medicine reminders, and self-monitoring of personal goals (Douglas et al., 2012 page 66). Ideas for some applications that are beneficial to persons needing AAC are:

For iPad®- Proloquo2go, Icommunicate, MyTalk, and Voice4U

For Android® Tablets- TaptoTalk, JABtalk, Voice4U, and AACSpeechBuddy

There is a very small learning curve needed for the use of tablets and mobile devices. These devices are extremely portable, easy to handle, and durable; making the use of tablets or mobile devices one of the smartest choices for the use of AAC devices that is available today.

Summary and Conclusion

When working with nonverbal students, such as selectively mute, Autism Spectrum Disorder, or behavioral disorder it is important to choose the right approach for each specific student. A team of professionals, family members, and the student, if possible, should be involved in the decision making process when creating a proper intervention. Many options are available to help increase communication for nonverbal children or adults. When looking to enhance the

results of an intervention, it is suggested to use a multimodal approach. In more developed cases, medication can be helpful in controlling the anxiety that is formed from some disorders such as selective mutism. When medication is chosen as a method of intervention, best results will be found if it is combined with behavioral interventions that are designed by a trained professional.

No matter the approach chosen, patience is needed. It is common for results to be achieved in a ladder fashion, meaning the subject will start off slow and work his way up to a normal speaking voice. It is important to pace the interventions in a way that is challenging to the subject yet not overwhelming.

In conclusion, the above studies have aided in the development of this study, Using Technology for Communication with Selective Mutism. Previous studies have help guide the methodology of the interventions, and assisted in creating an organized plan of action for the subject.

Chapter 3

Research Methodology

Setting and Participants

This study examined the effect that technology could have on the communication skills of a child with selective mutism.

The study took place in a small urban district located in Camden County near the city of Camden, New Jersey. The district has only one school that holds a total of 423 students ranging from preschool level to eighth grade. The district does not have its own high school resulting in the use of a nearby district's high school.

This small district has a District Factor Group rating of B. The District Factor Rating is a scale that represents an approximated measure of the nearby community's socioeconomic status. This District Factor Group rating is often used for examining the student's achievement and to aid in the comparison of school districts with similar socioeconomic statuses. The group rating is determined using six factors:

1) Percent of adults with no high school diploma
2) Percent of adults with some college education
3) Occupational status
4) Unemployment rate
5) Percent of individuals in poverty
6) Median family income (NJDOE, 2000)

Within this scoring, a rating of J would be considered the highest level of socioeconomic status and achievement. Alternately, the lowest level of socioeconomic status and achievement ratings is considered a level A.

The school district's demographics consist of 47% Hispanic, 36% Black, 9% Asian, 7% White, and 1% consisting of two or more races. Approximately, 87% of the students are eligible for free and reduced lunch compared to the state average of 33%.

The classroom in which this research was conducted is a third, fourth, and fifth grade self-contained classroom for students with learning disabilities. The class includes students with a wide range of special needs. The class includes four girls and eight boys, one certified special education teacher (the investigator) and a classroom aide who is also a certified special education teacher. In the classroom there is a wide variety of learning materials and technology to assist with the special needs of the children in the district. The school is fortunate to have a SmartBoard®, two student classroom computers, an iPad® and iPod®, and an interactive document camera. All of these amenities create a successful working environment for the students in the classroom.

Subject

Among the twelve students mentioned in the classroom was one boy that was chosen to be the subject for the topic of this research. The subject's parents were ecstatic at the interest in their son and are eager for him to receive the extra help in school. The parents immediately started mentioning the many concerns that they had for their pre-teen boy. The subject is a 12-year-old boy in the fifth grade

who is eligible for special education under the category of Communication Impaired. The subject has experienced signs and symptoms of selective mutism for the last five years of his life. This is his first year in the self -contained classroom, due to falling grades in the fourth grade general education setting with support. The classroom teacher reports that as the instruction is getting more rigorous the subject is having difficulty keeping up and staying organized.

Subject's History

The social history of the subject states that he was born premature. As a toddler, the subject suffered from asthma, chronic colds, and ear infections, however, this had not affected his hearing.

The subject was classified in Preschool as "Disabled with Communication Impaired" due to moderate receptive language difficulties and significant expressive language delays. Reports from previous years have stated that the subject spoke very little in preschool, and had always preferred to play alone. By the end of preschool, at around age 5, the subject had stopped talking and eating in the school, and frequently had accidents due to his fear of using the bathroom. There is no known traumatic situation or accident that might be the cause of this sudden change of behavior. However, the subject continued developing normally with his peers and in 2008, at the age of eight, the family took him for testing and he was diagnosed with selective mutism at a local university hospital.

At home the subject is described as happy, playful, loud, and an excited twelve year old boy, who speaks to his family and close friends. His native language in the home is Spanish, however, the subject is fluent in both English and Spanish.

The subject sought private Speech Therapy at a nearby hospital for a minimal period of time. Mom and Dad had reported that during private speech therapy he would speak sometimes, but very little. Dad reports that the subject's speech is often difficult to understand and the sound or tone of his speaking is equivalent to that of a much younger child.

In 2011, the subject was referred, by his classroom teacher, for a Speech and Language evaluation to be done by the school district. The teacher reported concerns regarding his ability to hear sounds in words, to learn and use new words, to understand his peers or teacher's requests, and of course his lack of production of speech and voice difficulties. The Child Study Team recommended that he be sent for an outside psychological evaluation, however it is reported that there was no follow through, to this date, from the family. At that time, the subject's family had also reported a recent diagnosis of Seizure disorder. The subject went for a MRI of the brain, however, the school has not been updated on the results of this test.

Method

Permission was given from the parents to proceed with the planned interventions that are part of the present study, and a conversation was had with the parents to see what other concerns were present. The list of concerns was endless, but the main idea of the conversation was to help the subject in any way possible. Concerns ranged from a look into the future, to his current weight gain and health issues due to his lack of eating while in school and lack of using the bathroom. A simplistic method would have to be used at first in order to help develop the whole child and then work on communication would be considered.

First a rapport needed to be created with the subject by spending one to one time with the subject and getting to know him better. That next day, the subject was invited to eat lunch in a private setting. He agreed and a discussion was had about how important it was for him to eat in school. His favorite show was put on the SmartBoard®, he was given privacy, and the time he needed to feel comfortable in the classroom. That first day he barely ate a bite of his sandwich. The subject ate his lunch with the lights turned off, and in complete privacy.. The subject progressed quickly. After a few days of eating lunch in the classroom, he would finally eat lunch with the lights on and an instructor present in the back of the classroom. In the beginning the subject would have his lunch brought to him in the classroom by an instructor, but after a few weeks of success, it was time to generalize his behavior.. The last goal was to have the subject order his own lunch by pointing to the item on the menu he wanted and carry it to class to eat. The subject quickly achieved this step and progression towards working with technology was about the commence.

One-on-one time together was needed to create a rapport that the subject needed to feel comfortable. Five generic questions were created that the subject could answer with his iPad®. Those controlled questions were as follows:

1. How are you today?
2. What would you like to eat for lunch today?
3. Which activity would you like to earn for your five minute Break Time today?
4. How do you feel about the lesson we just learned?
5. What did you have for dinner last night?

Once the subject became familiar and comfortable with the iPad® by playing games that included sound and typing responses on the notepad; these five questions were asked three times a week, and his willingness to answer based on level of prompting was collected. The goal for the subject was to use the iPad® without any prompting while answering questions or joining in on conversations, then to use it with peers in and outside of the classroom, and finally, to order his own lunch.

While implementing this controlled activity a few circumstances made working with the subject a little more difficult. For example, time, the amount of time allotted to work with the student one-on-one was minimal, which caused some regression in progress due to the time frame that was available to work privately together. Secondly, it was difficult to find a space in the school that was completely private. This was a necessity because it took the subject a few minutes each session to warm up. Once he felt comfortable, if another person walked in the room he would become anxious, and regaining his relaxation and willingness to cooperate was needed. All of the above circumstances could not be fully controlled.

Materials and Instruments

The materials used for this research study included an iPad®, rewards, and a chart for collecting data.

When using the iPad® the subject became more comfortable with working with the iPad®, first by playing games, then by typing his thoughts on the notepad, and lastly by using a communication application. The communication application that was used with the subject was SonoFlex® Lite by Tobii Technology. It is a free app that has a plethora of options for communication. This app allows the subject to

respond to questions with just the touch of a button. It has a feature that allows him to type responses or customize his answers.

When the desired behavior was achieved the subject would earn rewards. Prior to starting the research I had the subject complete a Student Reinforcement Survey.

Part 1 - Sentence Completion
Directions: Complete the following statements

1. My favorite adult at school is:

   The things I like to do with this adult are:

2. My best friend at school is:

   Some things I like to do with my best friend at school are:

3. Some other friends I have at school are:

   Some things I like to do with them are:

4. When I do well in school, a person I'd like to know about it is:

5. When I do well in school, I wish my teacher would:

6. At school, I'd like to spend more time with :

   Some things I'd like to do with this person are:

7. One thing I'd really like to do more in school is:

8. When I have free time at school I like to :

9. I feel great in school when:

10. The person who likes me best at school is:

    I think this person likes me because:

11. I will do almost anything to keep from:

Figure 1 Student Reinforcement Survey

12. The kind of punishment at school that I hate most is:

13. I sure get mad at school when I can't:

14. The think that upsets my teacher the most is:

15. The thing that upsets me the most is:

Part II Reinforcers (check all that apply)

Favorite Edible Reinforcers

- ❑ Candy (specify) _____
- ❑ Fruit (specify) _____
- ❑ Drinks (specify) _____
- ❑ Cereal (specify) _____
- ❑ Snacks (specify) _____
- ❑ Nuts (specify) _____
- ❑ Vegetables (specify) _____
- ❑ Other (specify) _____

Academic Reinforcers

- ❑ Going to library
- ❑ Having good work displayed
- ❑ Getting good grades
- ❑ Having parents praise good school work
- ❑ Giving reports
- ❑ Making projects
- ❑ Completing creative writing projects
- ❑ Earning teacher praise
- ❑ Helping grade papers
- ❑ Getting a good note home
- ❑ Earning stickers, points, etc.
- ❑ Other (specify) _____

Favorite Tangible Items

- ❑ Stuffed animals
- ❑ Pencils, markers, crayons
- ❑ Paper
- ❑ Trucks, tractors
- ❑ Sports equipment
- ❑ Toys
- ❑ Books
- ❑ Puzzles

Figure 1 Student Reinforcement Survey- continued

Activity Reinforcers

- ❑ Coloring/drawing/painting
- ❑ Making things
- ❑ Going on field trips
- ❑ Taking care of/playing with animals
- ❑ Going shopping
- ❑ Eating out in restaurant
- ❑ Going to movies
- ❑ Spending time alone
- ❑ Reading
- ❑ Having free time in class
- ❑ Having extra gym/recess time
- ❑ Working on the computer
- ❑ Other (specify) _____

Social Reinforcers

- ❑ Teaching things to other people
- ❑ Being the teacher's helper
- ❑ Spending time with my friends
- ❑ Spending time with the teacher
- ❑ Spending time with the principal
- ❑ Spending time with _____
- ❑ Having class parties
- ❑ Working with my friends in class
- ❑ Helping keep the room clean
- ❑ Being a tutor
- ❑ Being a leader in class
- ❑ Other (specify) _____

Recreation/Leisure Reinforcers

- ❑ Listening to music
- ❑ Singing
- ❑ Playing a musical instrument
- ❑ Watching TV
- ❑ Cooking
- ❑ Building models
- ❑ Woodworking/carpentry
- ❑ Sports (specify) _____
- ❑ Working with crafts
- ❑ Other (specify) _____
- ❑ Other (specify) _____

Figure 1 Student Reinforcement Survey- continued

This survey helped determine what things would like to work for. Miniature marshmallows and cookies were on the top of the list. Small pieces of these rewards were used to achieve the desired behavior of using the iPad® to express his thoughts.

Lastly, the chart used to document the subjects' progress was a very important material to the research. When tracking on this chart a wait time of five seconds was given before a prompt was established to determine if the prompt as actually needed. If a prompt was needed the least invasive prompt, verbal, was used first. If there continued to be no response a touch prompt to the hand of the subject was used, and then assisted hand to hand prompting was used if needed. This chart was utilized for 7 weeks to track his progress and documentation was kept to compare the data throughout the weeks.

Tracking Prompts for Communication	Unprompted	Verbal prompt	Touch prompt	Hand to hand prompt
How are you today?				
What would you like to eat for lunch today?				
Which activity would you like to earn for your five minute Break Time today?				
How do you feel about the lesson we just learned?				
What did you have for dinner last night?				

Figure 2 Tracking Prompts for Communication

Procedure

As noted earlier, the first step was creating a rapport with the subject. Time spent independently with the student both inside and outside school created much success. With the parents' permission, the subject worked privately in the school to

get comfortable with the iPad®. He at first played games and typed his responses on the notepad. Home visits were used to spend time with him and the family. Activities such as cooking pizza, and baking cookies were used to help build a relationship. The subject only would consume his food when a back was turned to him while he ate. Afterwards, he would get a chance to play with the iPad®.

It was in the school during a private session that the subject first used the SonoFlex® Application.. The first step required asking the subject questions that required a yes or no answer, such as “Are you ok?” “Can I ask you a few more questions?” and “Would you like to continue to work with me?”. The subject would, at first, try to answer using his typical head shake or nod, and was reminded to use his iPad®® for his response. The subject used preprogrammed “yes” and “no” keys just to get used to the application.. The subject was hesitant at first, but after about a thirty second wait time, a yes or no, choice was made. Small rewards were given, such as miniature marshmallows and miniature cookies, first for the willingness to cooperate, and second for any desired behaviors, such as responding, that the subject exhibited

Once the subject started becoming more familiar with the SonoFlex application, data collection would begin. Data was collected approximately three times per week, the predetermined five questions were asked and the data on needed prompts were collected. After data collection, the subject would work on other calming exercises that would help him become more comfortable.

During the time spent with the subject, videos were watched on other children with selective mutism and their success stories, another little girl in the

school classified with selective mutism was introduced to the subject. The subject was surprised to see other children that felt the same way as him.

As the subject progressed in the private setting, a transfer to a less private situation was required. The subject worked on using the iPad® in the classroom during lunchtime, with only his best friend present. The subject's friend asked the five questions, while data was collected. Next, he was relocated to the classroom setting with all of the students and finally, to the lunchroom to eventually work on ordering his lunch to the lunch staff.

In summary, the steps taken to increase a communicative response either technologically or verbally started off with creating a trusting rapport with the subject. It is important for any student to trust the teacher they are working with, and in this case trust was critical. Next, the iPad® was introduced in an informal manner. The subject was allowed to play games and type notes using the iPad®. Lastly, the SonoFlex® application was introduced, first in a casual manner, asking for preprogramed yes or no responses from the subject, and then becoming more specific with the questions asked, and how they were answered. The subject was required to answer five open-ended questions, throughout the seven weeks of the study, and his willingness to respond with or without prompting was collected.

Chapter 4

Results

Summary

In this research study, the results of using technology to increase communication for a young boy with selective mutism in a fifth grade special education classroom were explored. A technological device, in this case an iPad®, and a communication application known as the SonoFlex® Lite by Tobii Technology were used to answer the following research questions:

1. Can assistive technology, such as an iPad®, increase communicative interaction in a child with selective mutism?
2. Can assistive technology, such as an iPad®, increase verbal communication in the school setting with peers, teachers, and staff?

The subject was assessed based on his willingness to communicate with others both with the iPad® and without. To determine the baseline, the subject was asked five predetermined questions, leaving the option open for him to answer verbally or with technological communication. The questions asked were:

1. How are you today?
2. What would you like to eat for lunch today?
3. Which activity would you like to earn for your five minute Break-Time today?
4. How do you feel about the lesson we just learned?
5. What did you have for dinner last night?

If the subject failed to respond to the questions, he was encouraged using increasing levels of prompting beginning with a verbal prompt, such as ("Use your iPad®"), touch prompting (the teacher touched the subject's iPad® to cue the subject

to use the device), and, finally, hand-to-hand prompting in which the teacher placed her hand over that of the subject and directed his hand to use the iPad®.

After the baseline assessment, interventions were used in a private setting in the school building, and at home with his family in hopes of achieving an unprompted response from the subject.

Results

The baseline results were determined by asking the five questions that would be used for the purpose of collecting data throughout the rest of the study. The subject was given the chance to answer the questions by way of verbal communication, or communication through the iPad® application. In the baseline session the subject failed to respond either verbally and or using the assistive technology.

Data was then collected on the student's response to the questions three times a week for six more weeks. The questions were asked in the same order each time. The following figures show the frequency of the student's responses. Figure 1 shows the student's response frequency by the level of prompting used. Figure 2 shows the frequency of unprompted responses.

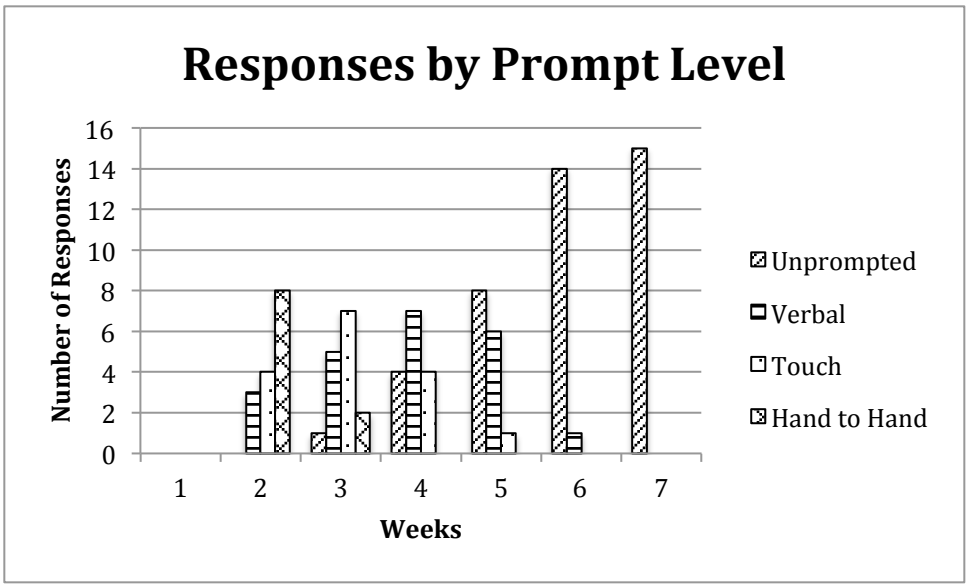

Figure 3 Responses by Prompt Level

Figure three shows how the subject responded to each of the questions throughout the seven weeks of data collection. During the baseline session there were no responses to the questions, either verbally or using the technology.

In week two the subject responded eight times when hand to hand prompts were used, four to touch prompts and three times to verbal prompts. The subject made no unprompted responses. In week three, the subject responded twice when hand-to-hand prompts were used, seven times to touch prompts, five times to verbal prompts and one time when no prompt was used. The subject used the iPad® for all of the responses. In week four the subject responded four times to touch prompts, seven times to verbal prompts, and four times with no prompt. Again, all of the responses were with the iPad®.. In weeks five through seven there was a pattern of increased responses to the questions with decreasing levels of prompting.

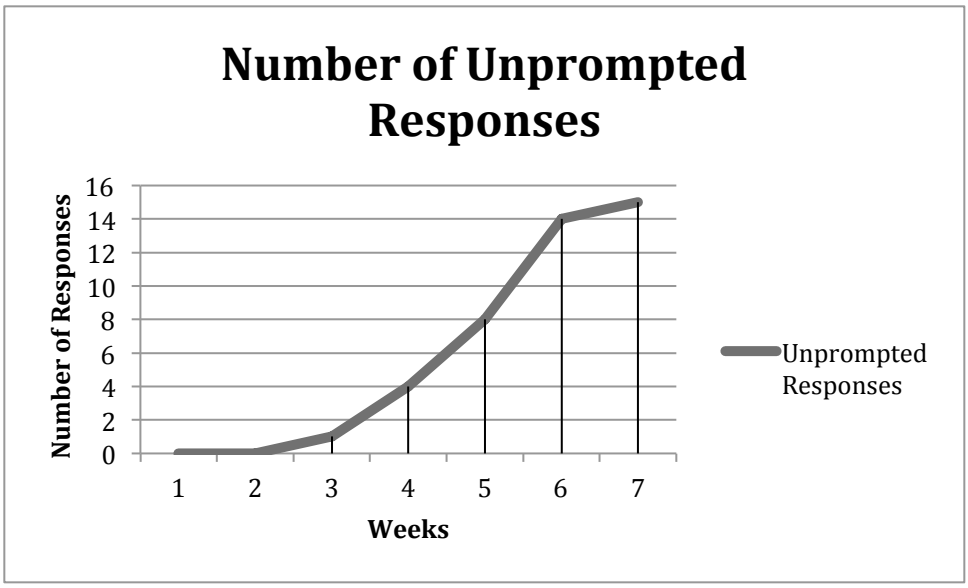

Figure 4 Number of Unprompted Response

Since the goal of this research was for the student to make unprompted responses to communicative attempts, the student's unprompted responses to the questions were analyzed separately. Figure four shows the results for the number of unprompted responses during the seven weeks of data collection. In week one there were no unprompted responses, either verbally or using the technology. In week two the subject still did not communicate without prompting either verbally or using the technology. In week three the subject responded using the technology one time without prompting. Between weeks four through seven the student made rapid progress in communicating using the iPad® and SonoFlex® application. The student responded eight times in week five, fourteen in week six, and a total of fifteen in week seven. In week seven the subject responded to all five questions asked during the three days of data collection with an unprompted technological response.

Table one shows the student's responses to each of the questions by level of prompting during each testing session. The key below the table shows the levels of prompting used. As seen in the table, the subject progressed throughout the seven weeks of the data collection period and in weeks six and seven showed the achievement of a communicative response that was determined without the prompting of teachers, peers, or family.

Table 1 Results of Subjects Responses by Level of Prompting:
Key: 4= Hand to hand prompting, 3= Touch Prompting, 2= Verbal Prompting, 1= Unprompting

Week		Question 1	Question 2	Question 3	Question 4	Question 5
2	1/6/14	4	4	4	4	4
2	1/8/14	4	3	2	3	3
2	1/10/14	4	4	3	2	2
3	1/13/14	4	3	3	2	2
3	1/15/14	4	3	3	3	3
3	1/17/14	3	2	2	2	1
4	1/21/14	3	3	2	2	2
4	1/22/14	3	2	2	1	1
4	1/24/14	3	2	2	1	1
5	1/27/14	3	2	2	1	1
5	1/29/14	2	2	1	1	1
5	1/31/14	2	2	1	1	1
6	2/3/14	2	1	1	1	1
6	2/5/14	1	1	1	1	1
6	2/7/14	1	1	1	1	1
7	2/10/14	1	1	1	1	1
7	2/12/14	1	1	1	1	1
7	2/14/14	1	1	1	1	1

Chapter 5

Discussion

Review

This study examined the effect that a communicative device such as an iPad®, and a communication application known as SonoFlex® Lite by Tobii Technology had on the verbal communication of a child with selective mutism. It was hypothesized that the communication device and app would increase the subject's communication. Also, it was hypothesized that the increase of communication through the technological device would eventually increase verbal communication with trusted peers, teachers, and school staff members.

The results have indicated that, with time and patience, the iPad® has increased the subject's communication. The data has shown the subject's responsiveness to a set of questions developed by the researcher increased. At the same time, the level of prompting that was needed was reduced. By the end of the intervention, using the iPad®, the student responded to all of the questions without prompting.

These results have proven the hypothesis that a communication device, such as an iPad®, can improve communication for a subject with selective mutism. However, the results have not yet shown that the subject can generalize the communication to verbal communication. The subject's success at expanding his level of communication using the iPad® increased in the controlled setting, however communication did not increase in any alternate settings.

In a review of the literature on augmentative and alternative communication, Schlosser and Wendt reviewed data on a variety of different types of Augmentative and Alternative Communication devices (AAC) and the likelihood of eliciting speech. Technological systems, PECS systems, and manual sign language all proved beneficial to increasing communication in children with non-verbal disabilities. Also, the previous research has stated that 89% of their participants showed increase in speech production by the end of their studies (Schlosser & Wendt, 2008). Although, the results of the current study were not similar, with extended and additional resources it is probable that similar results could be obtained.

Limitations

The most distinctive limitation that affected the study was time. Plenty of time was spent outside of school with the subject, and as much time as possible was given during school hours. However, many factors got in the way of maximizing the time that was spent with the subject.

For one, the study took place in the winter. This winter was particularly poor, and many school days were spent at home. Due to the large number of days out of school because of extreme winter weather, the number of planned private sessions was severely decreased. These days spent away from the student adversely affected his progress. Consequently, even if the iPad® was available for use at home, practice of the desired behavior could not take place due to the fact that verbal communication exists in the home. Secondly, the class that the subject was placed with consisted of eleven other special needs children, with at least five students falling under the Emotionally Disturbed category. As the subject's

classroom teacher, it was known that not enough individualized attention was given to the subject, due to dealing with other difficulties in the classroom. All of these time factors could have affected the success of the study.

Another limitation was the availability of resources. The classroom has only one iPad® that is required to be used with the whole class. The subject had his own application that was set up on the tablet, however the tablet would often have to be shared with others in the classroom, as well as with the teacher for a lesson. This created a limitation because the subject did not have the iPad® readily available at all times. The subject was unable to have the iPad® in his possession at all times, however teachers and classmates made sure to give the iPad® to the subject at the onset of a discussion. This limited his communication due to the fact that he did not have his "voice" readily available, whenever he wanted it. Steps were taken to get a personalized tablet for the subject; however, time, money, and availability did not allow that to happen.

Practical Implications

This study has shown that the use of advanced assistive technology can help create communicative situations for a child with selective mutism. It is important to consider many different options when deciding what intervention to use. This study has provided reliable data that a common device such as the iPad® can create successful situations to enhance different forms of communication. The use of an iPad® is a practical solution to use with students with disabilities especially those with nonverbal difficulties. These devices are widely used across all ways of life: personally, academically, and socially. The devices are easily accessible and widely

accepted in society. Not only is it an easy and acceptable step towards creating verbal communication, but also it can create a feeling of belonging with the students' peers who also have a tablet device.

Although the results of this study did not show that the student made progress toward verbal communication, previous research shows success with speech development from nonverbal students after using digital forms of communication. A continuation of this study for an extended period of time might produce success with verbal communication. In future studies the goal would be to increase more methodical one to one interactions with the subject, implement more desired rewards, make technology more accessible, and create further increase of the communication, either technologically or verbally. With more time and equipment available the subject should be able to expand the behavior into a verbal speaking situation with confidence and enthusiasm.

Conclusion

This study has shown that when a child with selective mutism is given a chance to communicate using assistive technology, he can make progress. The subject showed an increase in communication in a trusted setting. Communication increased when the student used the iPad® paired with a communication application (SonoFlex® Lite). Considering the positive results collected through this study, as well as, other studies that were previously discussed, it is safe to hypothesize that when assistive technology is paired with gradual intervention, it can create opportunities for increased communication. It was found that children with a nonverbal disabilities are now able to use other ways to communicate and

can work towards a successful future that may or may not include verbal communication.

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