TEACHER AS RESEARCHER: A CASE STUDY ON MULTIMODAL COMMUNICATION

INTERVENTION IN THE SPECIAL EDUCATION CLASSROOM

by

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Abstract

Functional communication has always been a challenge for individuals with severe intellectual disabilities and speech and language impairments, yet it is one of the most important aspects of our daily life as humans. It is what we use to convey our most basic wants and needs, transfer information, and interact socially with one another. Communication systems increase student independence which in turn decreases the amount of behavioral problems, mainly tantrums and self-injurious behaviors, which are usually present when students do not have an effective mode of communication (Sigafoos, Arthur-Kelly, &Butterfield, 2006). In the past few decades, great strides have been made in improving the communication opportunities for individuals with communication barriers and their communication partners. There has been an increase in popularity of both high tech and low-tech augmentative and alternative communication (AAC) devices, which give these individuals an effective mode of communication. These can be anything from a picture card exchange to request an item, to a high tech digitized speech device with dynamic screen displays. This is a case study about the implementation of a multi-modal communication system and it's effect on an individual learner's expressive speech. The study is designed as action research done by a teacher in a special education classroom. Data is collected during communication activities, which are embedded into academic instruction and during the creation of contrived situations that facilitate the development of the learner's communicative skills. This paper presents Action Research as a viable and practical research methodology by

chronicling one special educator's experience in implementing an action research

study.

Literature Review

According to Merriam Webster, the definition of communication is, "the act or process of using words, sounds, signs, or behaviors to express or exchange information or to express your ideas, thoughts, feelings, etc., to someone else." Communication is a challenge for individuals with severe intellectuals disabilities and speech and language impairments, and we often see large communication barriers with individuals in this population. As stated in the definition, our ability to communicate is what allows us to transfer information to another person. Whether it is a request for a drink from a parent, or a joke with friends, communication is one of the most important parts of our daily life as humans. For individuals with severe intellectual disabilities, it is often non-existent. Augmentative and Alternative Communication (AAC) can help individuals with communication barriers by giving them an effective mode of communication. According to the American Speech-Language-Hearing Association, AAC "includes all forms of communication (other than oral speech) that are used to express thoughts, needs, wants, and ideas." AAC systems can either be aided, meaning that they require external equipment in addition to the learner to communicate or unaided, meaning the learner is only using his or her body to communicate (ASHA). In the classroom these unaided AAC interventions, such as sign language and the interpretation of gestures, are used as well as aided systems, such as picture schedules, choice boards, switches, and other digital communication devices. All of these factors and possibilities should be considered when creating a communication system for a learner; however, they are usually not specifically designed and implemented systematically for each student.

Because of this self-initiated communication interactions are difficult for these students in this population.

Students with severe intellectual disabilities communicate at a variety of different levels, even if they are categorized as non-verbal. Typically these students are split into two main groups; symbolic and non-symbolic communicators. One subgroup of non-symbolic communicators is perlocutionary communicators. Perlocutionary communicators do not communicate purposefully. "They may fuss, cry, exhibit facial expressions, make vocalizations, or move their bodies to communicate" (Ogletree, Bruce, Finch, Fahley, McLean, 2010, 165). All of these examples are modes of communication, which are usually in response to specific stimuli. It is the communication partner's responsibility to recognize and interpret that these certain behaviors exhibited by students are a form of communication of the student's wants and needs or satisfaction and dissatisfaction. Illocutionary communicators are also non-symbolic, however they communicate with purpose. For example if they want a juice box, they might stare at the juice box or point at it, and then point to, or look at the person who can give them that juice box. Once the student receives the juice box, they no longer make these gestures because their needs have been met.

Symbolic communicators or locutionary communicators are able to communicate by using symbol systems though AAC. There is a wide range of symbols that learners with severe intellectual disabilities may use depending on their comprehension abilities. Symbols range from actual objects, which are the most iconic, because they look and feel very similar to the object they represent. For

example, a picture card with a piece of a spoon attached to it could mean

"lunchtime." You could also represent lunchtime in other ways for example showing

a picture of the actual cafeteria that the student eats in, using a PCS symbol of a

paper lunch bag, or by writing the actual word "lunchtime". In these examples the

actual written word would be the least iconic, and would require more cognitive

skills to associate that word with it's meaning.

In my research I focused on a student who is a locutionary communicator.

Presently, he is able to verbally say approximately 10 words clearly, when prompted

to, and will occasionally mumble unfamiliar words. He frequently uses gestures and

vocalizations, including pointing and facial expressions, to communicate that he

wants something, for example his iPad, and also to communicate dislikes. In an

article by Ogletree, Bruce, Finch, Fahey, and McLean, they recommend a multitude of

different research based interventions to use while trying to implement a

communication system for a locutionary communicator. Some of these include

pairing symbols (picture cards) with speech while you are asking a learner to make

a selection between two choices and using PCS picture symbols to create full

sentences, for example "I" "want" "a truck" (each word listed appears on a separate

card). This will help the student learn to use two or three word expressions as a

method of requesting as opposed to just pointing at a picture card, which will

eventually lead into the creation of simple sentences. They also suggest

incorporating communication into literacy lessons by reading books with repeated

story lines, and implementing the use of communication switch so that the learner

can communicate what the repeated storyline is as well as having devices for them

to communicate when it is time to turn the page, start reading, or read a different book.

Multimodal communication systems (Beukelman and Mirenda, 2005, 239) are developed specifically for an individual learner, and include multiple methods of receptive and expressive communication. These can include low tech and high tech assistive technology devices, verbal speech, and both aided and unaided symbols. While creating a communication system, it is very important to think about how the learner is going to use it and where they are going to use it. There are a lot of different considerations such as issues of accessibility, portability, and durability. Can these devices be easily transported from the classroom to the gym or to the home? Is it easy for the learner to access the device and use it? Are all of the communication partners trained to use the communication system? What would happen if the device got wet with water or saliva? How are the devices going to be used throughout the day? These are just a few of the questions to consider while developing and implementing a multimodal communication system. The goal of the implementation of this system is to increase the learner's self initiated speech, which will hopefully decrease some of the learner's problem behaviors that are associated with the inability to make socially acceptable requests (Beukelman and Mirenda, 2005, 8).

Profile of the Learner

The learner with whom I am working is a seven year old who is classified as having multiple disabilities and is in a self-contained setting for students with

severe and profound disabilities intellectually. His developmental delays have impacted his development of expressive speech. The learner is able to produce some symbolic speech but only when he is prompted to do so verbally and sometimes visually through a yes or no question or a selection of a preferred item. For example if you ask the student, "Do you want iPad? Yes or No," he can respond to the question verbally. Unless prompted otherwise, the learner communicates through gestures, verbal and physical outbursts, and facial expressions. This learner would be a prime candidate for a multimodal AAC system because he currently does not have any way of communicating besides his limited speech, gestures, and the other unaided cues that he typically uses.

This learner has very few fine motor difficulties, but is typically tactile defensive to certain objects. If the learner is interested in a toy he usually grabs it from you and puts it up to his face to look at it closer. This is due to the fact that he has retinopathy of prematurity and has been diagnosed as legally blind. His favorite toys usually have bright lights or movable patterns for visual stimulation. He also likes to look at picture cards of preferred items because of the repetitive sound they make when he flicks them with his thumb. This learner is cognitively one of the highest functioning students in his class, however he has not yet realized the power of verbal communication. His communication system will need to be portable, durable, and easily accessible so that he can learn that it is a more efficient way for him to communicate his wants and needs. He will also need the ability to use the system in many different environments in the school, including outside and in different specials such as music and physical education.

This learner does have experience with the Board Maker symbol system, however he has very little experience with voice output devices. I do think this learner would benefit from an augmentative voice output device as a part of his system, because even though he is in the process of developing speech, it is a slow process and research has shown that augmentative communication devices can actually help facilitate the development of standard speech. (Beukelman & Mirenda, 2005). Teachers and TA's have begun to work with this learner to say different words and phrases such as yes and no, the days of the week, numbers, hello and goodbye, I want (preferred object), I am done, I need to potty, and other two to three word semantic relations modified from the PECS system. The teacher models each word while pointing to it's symbol and then has the learner repeat each word.

To initiate a communication interaction, the learner typically is prompted or resorts to using an inappropriate behavior such as gross vocalizations or head banging. A multimodal AAC system would help the learner initiate conversation in a more effective manner, as well as show communication partners the intent for which he is communicating. He may need help, want something, or just want to have a conversation. During choice time his preferred items are the iPad, different visually stimulating toys, and a car video. When asked, "What do you want," the learner can respond with "toys" or "iPad" independently. However he cannot initiate a request for something he wants. He will start crying or screaming to indicate that he needs/wants attention or some object. A communication partner would help maintain the conversation by asking prompting yes or no questions or questions that he can answer using his communication device. To terminate an

interaction or an activity he can either use his device to say, "I'm done" or "Bye." His methods of initiating and terminating conversations can be accompanied by a wave or another appropriate gesture. If the learner is communicating with a peer, a teacher should help facilitate the communication interaction between the two students. Communication partners will have to be patient as the AAC device is implemented because there may be some response latency.

The learner is typically quiet and reserved, and needs prompting before speaking more than one or two word utterances. This learner is very aware of the power of communication; however, he usually communicates in unconventional ways. With AAC the learner can conventionally communicate his wants and needs in a variety of different settings from the classroom to other locations in the community. Although the learner is typically withdrawn from his peers and does not pay a lot of attention to social interaction, implementation of an AAC device will allow the learner to communicate more effectively with individuals in an inclusive setting. This is important because next year the learner is going to start leaving his classroom with a one on one assistant and go to another classroom for inclusion in some subject areas with modifications.

The only system of language and aided communication this learner is using right now is speech and PCS picture cards to answer questions and read certain areas of the room. He still relies on pointing, gestures, yelling, crying, and other transitional types of communication, which shows he would benefit greatly from a multimodal AAC system. The teaching of language and communication skills are included by his teachers and paraprofessionals during most of his academic lessons,

but the learner's new multimodal AAC system will allow him to initiate

conversations for both academic and functional purposes.

Overview of Action Research

        "Action research is a practical approach to professional inquiry in any social

situation" (Waters-Adam, 2006, p. 2). The principal behind action research, as it

relates to the field of education, is that it is something you are doing while you are

teaching as a method of improving your practice and increasing student

achievement. In education there are a variety of different best practices, research

based interventions and teaching strategies but the effectiveness of these strategies

is different based on the way the teacher implements the strategy or intervention.

Many people believe that action research cuts down on the discrepancy between

theory and practice in education since it requires the teacher to constantly reflect on

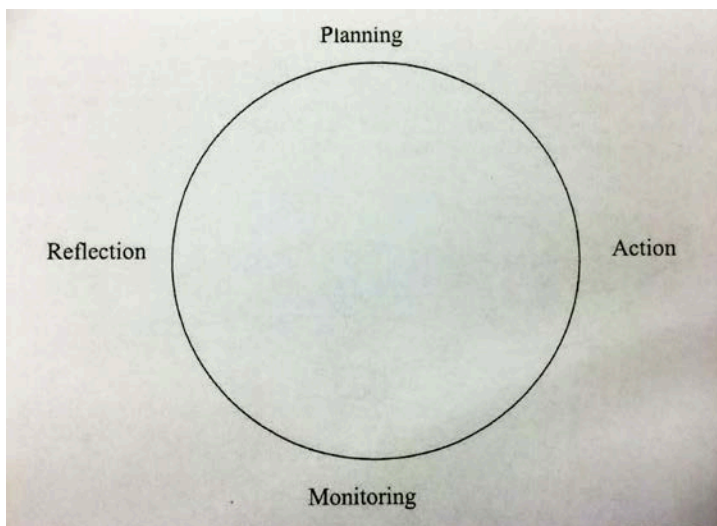their approach and modify it to best meet the needs of all students.

The cycle diagram *(Figure 1)* best describes this technique and how it can be used to improve teaching. The first stage of the cycle is planning, next is the action, followed by monitoring, and then reflection (Waters-Adam, 2006).

Figure 1: The Action Research Cycle

The first step of the cycle is to plan. In this stage it is important to identify a problem, research best practices, and develop a research question. In this research study, the problem is that the focus learner is not able to effectively communicate his wants and needs and tends to exhibit negative behaviors as a result of his inability to communicate. His expressive vocabulary is approximately ten words, and he can repeat words when prompted to do so several times, however these words are very unclear and mumbled when he produces them. A multimodal communication system was the best practice that was identified to implement with the focus learner. Research Question: Will the implementation of a multimodal communication system increase a learner's use of purposeful expressive communication?

The second step of the cycle is action. During this stage, a multimodal communication system will be developed and implemented with the focus learner. Each of the components of the learner's system will serve a different communication purpose and can be used in different settings. The third step of the cycle is monitoring which is done using both qualitative and quantitative data collection. The last step of the cycle is reflection about the process and the outcome for your practice or your student(s). In this study, this stage includes talking about the gains that the focus learner has made in his expressive communication skills as shown by the data that was collected through teacher observation. It also includes talking about areas for improvement, successes and challenges with the action research process, and implications for future research.

Since it is a constant cycle, it is not just problem solving. You are constantly using your data to collect, to monitor the effectiveness of your intervention, and to modify or change it as needed. It is also important to remember that it is not the application of a scientific method to teaching, or clinical research in the classroom. Instead, it is a process of change; researcher, subjects, and situations are changed.

Steps of Action Research		
1. Identify the question Identify an issue or problem that needs to be solved. Once you have solidified the parameters of the problem, target the question you want to investigate**.**	Getting Started "It is not enough that ateacher's work should be studied; they need to study it themselves." Stenhouse, 1975	**4. Analyze the Data** Determine what your data tells you and use this information to make data driven decisions about your question and about future directions.
2. Action Plan What strategies/methods are you going to use? Develop your plan of action, akin to methodology**.**	**3. Collect the Data** Follow sound data collection strategies and clearly document your data collection activities.	**5. Share the Findings** This is the last stage of action research and you should share your findings in situations promoting continued development.

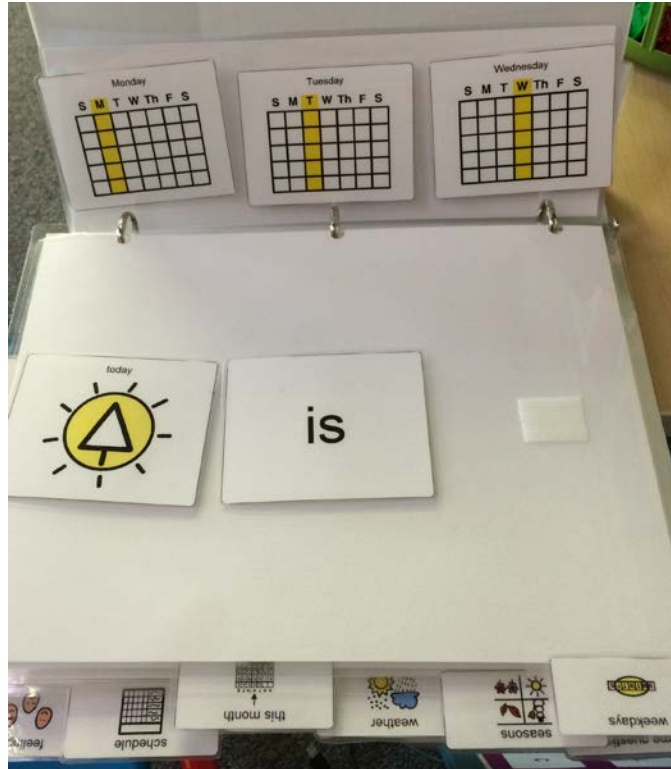**Planning: Elements of the Learner's System**

The first element of the learner's system will be a GoTalk Pocket. This is a speech generated AAC device with a static screen that can be programmed to say six individual messages of up to thirty seconds each. This device can either be worn around a learner's neck or put in his pocket, and it is very lightweight and portable. It can be used in a variety of different settings for generalization purposes. Because

of this, this device would only have the learners' basic needs on it. For example it

would say *I want help, I want potty*, *I want to make a choice, I want a toy to play with,*

I am hungry, and *I am thirsty.* For consistency, I am going to use the Boardmaker

Symbol System for this AAC device because it is iconic, and it is what the learner

with which I am working is currently using in the classroom.

The second element of the learners system is going to be a communication

ring organized by topic that connects with topics in a binder. Boardmaker symbols

are going to be cut out, laminated, and velcroed to strips of poster paper. These

strips of poster paper will each contain four symbols and be held together with a

ring. The topics that will be in the ring and binder are *seasons, months, choice time*

requests, days of the week, weather, feeling, etc. When the learner is asked a question

such as what month is it? He will be shown the strip of poster paper with all four

months listed on it. He then will put the picture card that he chooses onto the velcro

strip in his book that will have a fill in the blank simple sentence in it. On the Season

Page it will say, *It is _____*. The learner will place *winter* or the season that he

picks in the blank and read the sentence, *It is winter.* This is how he will answer his

teachers' question. Initially the learner will need a lot of verbal prompting and

support to use this system, however hopefully the use of sentences during all

aspects of the learner's daily schedule will eventually lead to an increase in self

initiated speech. The learner is going to use this to answer questions during

morning circle and other academic subjects, as well as during transitions. I chose

this intervention because it is an adapted form of the Picture Exchange

Communication System, which my teacher is currently using with the learner in two

contexts. The learner uses a clipboard with a sentence strip on it for the bathroom

that says, *Time to potty* and *I want iPad.* He also says his name every morning using

a velcro board that says, *My name is Lance*. These interventions are working really

well for the learner and he is now able to recognize sight words such as, *it, time, is,*

to, for, want, I, and many more. Recognizing sight words and being able to

communicate them verbally or with an augmentative communication device is also

one of the learners Individualized Education Plan (IEP) goals, so it is important that

this device facilitates the increase in the learner's sight word vocabulary. This book

would generalize the learner's ability to say a sentence when he wants something to

other academic and functional settings.

The next elements of the learners system are three Intellikeys Overlays, which are assistive keyboards. The letters and numbers on the keyboard are enlarged and separated, to help with the learners visual impairment and fine motor issues, and will attach to the learners computer. One of the overlays will have the letters of the learners name on it as well as a picture of him. The letters will be in the name order so he can learn how to spell and recognize his name, which is one of his IEP goals. The next keyboard will have the whole alphabet in ABC order instead of a traditional order. This is beneficial because the learner knows all of his letters in alphabetical order as well as the sounds they make so he will not have to learn the letter order of a traditional keyboard. The learner will use this to type vocabulary words with support initially, and will eventually learn to use the keyboard as a replacement for handwriting during academic subjects. The last keyboard will be

the number keyboard 0-9 that the learner can use during math. He will use this to

identify and type numbers 1-20, and will also hopefully use it to complete math facts

with prompting.
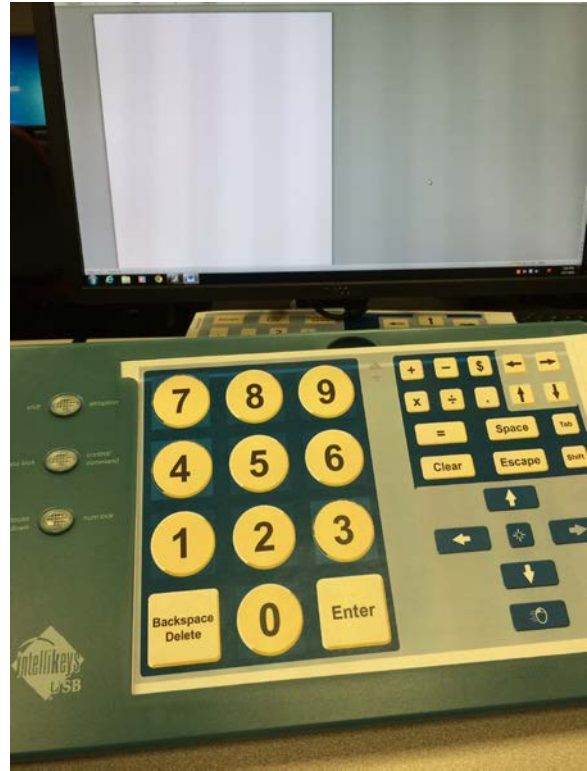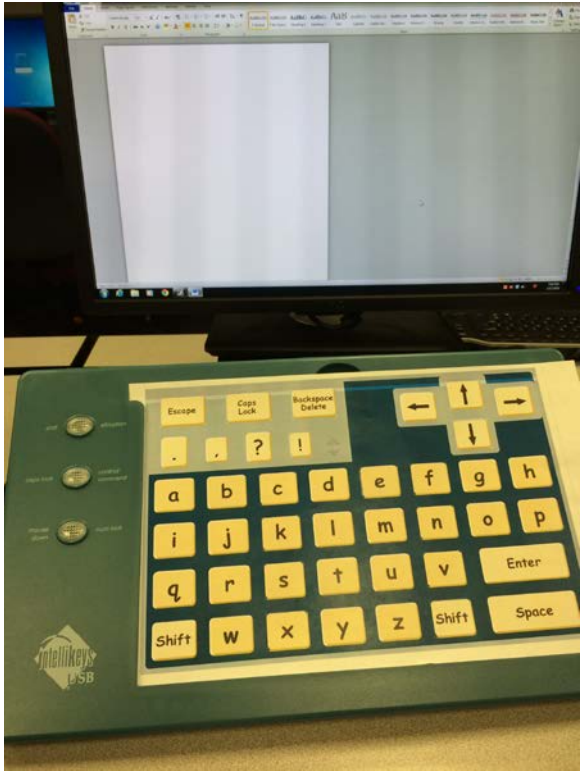
The learner will also have a Go Talk 4 and 9 that can be used during lessons for

specific vocabulary that is related to the lesson or book that he is reading. He has

used a Go Talk 4 this year during morning group to answer questions about the day

of the week, month of the year, and weather, and he does really well using these to

answer questions. Since this is a voice output device, it is a model of speech as well

as a way to facilitate the learner in answering questions with multiple choices and

identifying new vocabulary words. The last device that I am going to create for the

learner is a First Next board. This is going to be used to assist the learner in

transitioning from activity to activity and help him to plan his day. This will

hopefully ease some of the struggles that he has with behaviors during transition time. This system will sit on the learner's desk and it will change throughout the day. For example iy may say First: Language Arts, Next: iPad. He will then be aware that if he makes it though the language arts lesson he will have the opportunity to use the iPad.

In my original development of the learner's communication system, I attempted to use a variety of different modes of communication including low-tech picture card in communication books and mid tech digitize speech devices such as the Go-Talk 9. In their research study, Boesch, Wendt, Subramanian, Hsu were trying to determine whether PECS or speech-generated devices were more effective in the development of requesting skills in students with severe Autism. The Picture Exchange Communication System proposes six steps to teaching a child how to independently request an object. The student starts out by selecting the object they want between two picture cards. They gradually transition to three or four word phrases, and then begin adding descriptors, such as colors to create a complete sentence. The final steps involve more complex skills and students do not always master the final levels, however research has shown that the program has been effective in increasing requesting skills in students with significant communication impairments.

Speech generated AAC devices are very prevalent with learners who do not have functional communication skills. There are many different varieties of speech-generated devices (SGD's), which include mid and high tech devices that have either static or computerized screens. The key feature of these devices is that there is a

synthesized speech output that is being used. In general SGD's are easier to use across different settings because they do not require the communication partner to be directly involved with the learner while they are communicating. "Similar to natural speech production, the speech signal from the SGD is immediately made available to anyone within hearing distance" (Boesch, Wendt, Subramanian, Hsu, 2013, 481).

Of the three students who were included in this research study, no data was collected that really showed a difference in the efficacy of one intervention over the other one. Based on this research, and the research of others, either PECS or SGD's can be used to effectively teach requesting skills to students with Autism, but it is important that they are able to determine what each symbol represents. There were good comparisons that were made about the pros and cons of PECS and the Prox-Talker SGD (the device used for this study), which included the cost and portability. The researchers suggest determining whether there is a way to implement the PECS system onto high tech AAC devices (Boesch, Wendt, Subramanian, Hsu, 2013, 481). In general of all the research based AAC interventions, there is not one system that is better that the others, but rather the effectiveness of specific AAC devices varies widely based the learner with which you are working. Multimodal systems are so important because they give the learner multiple modes of ways to communicate with others.

Planning: Teaching Strategies

Many times students in special education classes who do not have a functional way to communicate resort to using what is seen by society as "inappropriate"

communication methods. These can include repeated vocalizations, actions such as hitting objects or communication partners or head banging, and any other behaviors that are caused by an either positive or negative stimulus that the student experiences. For example, if a learner is screaming because his or her toy is out of reach or not turned on, a more appropriate way for the student to communicate this would be saying "I need help," with the assistance of an AAC device. In 1990 Durand came up with a method called Functional Communication Training, which assumes that the majority of "problem behaviors" are communication attempts (FCT, Durand, 1993). The inappropriate behaviors that a student exhibits may have a variety of different functions for example the student above may also use yelling to say, "I'm hungry, or "I want to take a break." In a single subject research study done by Franco, Lang, O'Reilly, Chan, Sigafoos, and Rispoli a student with Autism was given a speech-generated device (SGD) with 12 choices on a static display screen. His speech generated communication device gave him the ability to ask for breaks as well as request specific things that he enjoyed, which the researchers categorized as requests to escape and requests for tangibles. The intervention was generalized across three different settings including the classroom, gym, and playground.

After the intervention there was a decrease in inappropriate vocalizations and an increase in engagement when the student was using the SGD. The learner was able to successfully generalize the SGD into two different environments, which increased the amount of time he spent on topic because he had an appropriate way of communicating his wants and needs. (Franco, Lang, O'Reilly, Chan, Sigafoos, and Rispoli, 2009.)

McCathren did a study with one learner who had severe intellectual disabilities and was identified as a pre-linguistic and pre-symbolic communicator. In this study she identified many research-based strategies that are effective for teaching communication skills. One of these strategies is modeling. Modeling communication behaviors and gestures is important for teaching students pragmatic language skills and intentional gestural communications. For example waving to someone when they leave, pointing to an object that you want, laughing at a funny face, etc. (McCathren, 2000, 5). In this study, modeling of appropriate gestures and verbal communication was done. For example when the learner didn't want something, instead of throwing it and yelling, I modeled saying "no" while simultaneously shaking my head. Then time delay and explicit directions of "your turn" were given. The student would imitate what was just modeled and gradually work towards doing this independently. Another strategy that was used a lot during this communication intervention was prompting. Prompting in this intervention was done by the teacher to facilitate the use communication either verbally or using AAC. For example when the learner's toy runs out of batteries and he starts banging it on his head and crying, the communication partner would ask "What do you need?" and model saying "help." Eventually the student will be able to answer that prompting question without modeling and after this he will hopefully learn to ask for help independently (McCathren, 2000, 5).

Behavior management systems and other methods of positive behavior support can also help facilitate increases in communication. Even when you have given a student an appropriate method of communication, there still may be behaviors that

they exhibit that are viewed as inappropriate. One example of these reward boards that was used with my focus learner was a token economy reward board. These low tech boards can increase communication opportunities by allowing students to select their own item to reinforce their behavior or "what they want to work for." Throughout the lesson they are given tokens for participating, correctly answering questions, and demonstrating good behavior. Once the student has obtained three tokens they are rewarded with the item for which they chose to work. This allows students to take ownership for their own learning and recognize that they are going to be rewarded based on their effort and they are going to be rewarded with something that they want.

Action and Monitoring

Both the baseline and intervention data were collected throughout the day, when the learner was given a communication opportunity. These opportunities occurred during academic time, functional and self-care time, as well as during transitions. The classroom teacher, teacher assistants and I all knew how to implement the multimodal communication system and were involved in it's teaching and data collection. Daily data was collected both qualitatively and quantitatively and it was aggregated weekly. Data was based off of my research question and the learner's Individualized Education Plan. The goal of the intervention is for the learner to increase his expressive vocabulary and communication in the classroom by saying/reading picture/word cards with verbal and gestural prompts. Because of the learner's disability and cognitive levels, I decided to compile the data weekly so there would be less variability than if it were

collected on a day to day basis. I also collected both the baseline and intervention

data over the course of three weeks. Quantitative data was collected as the focus

student was saying or reading picture cards or using another aspect of his system to

communicate with an individual or answer a question. The attempts and the

percentage that were correct were tallied on a data collection sheet during the

baseline phase and graphed weekly *(Figure 6)*. Data was collected in the same

manner during the intervention phase and graphs were analyzed for trends to

determine the effectiveness of the intervention. Qualitative data was collected in the

description column of the data sheet by writing the setting in which the

communication happened as well as what was said by the focus learner. In this

section the support that the focus learner needed to effectively communicate in

either a social of functional setting were recorded. The support included verbal and

gestural prompts.

Results and Data
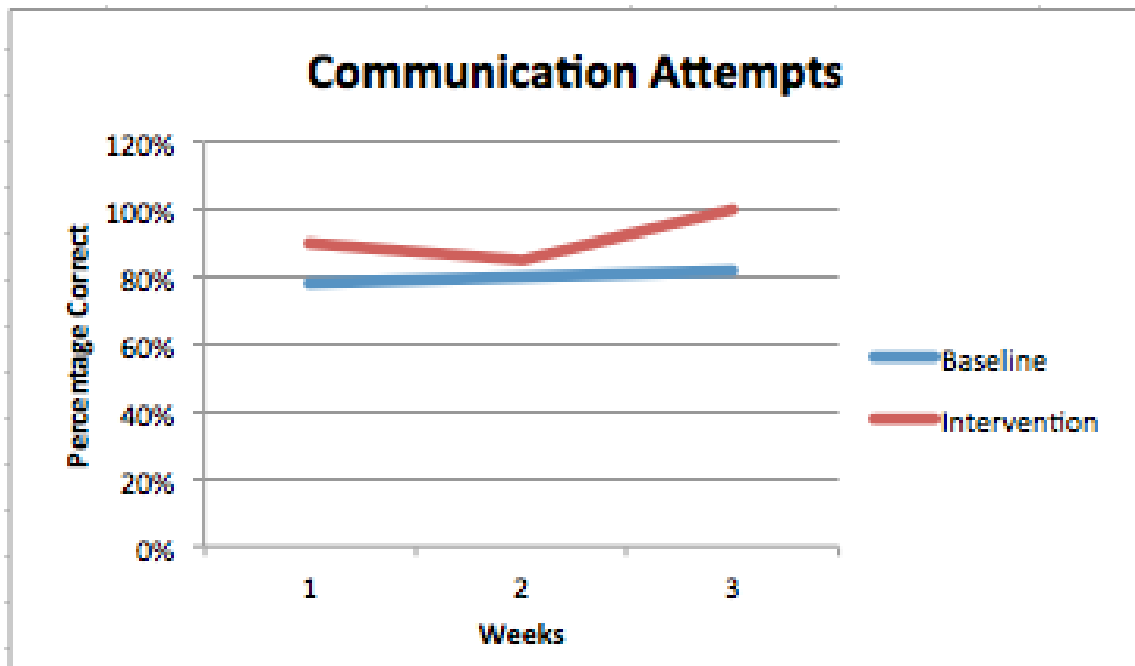
Conclusion and Reflection

As shown in the data that was collected in relation to the learner's IEP goal of increased expressive speech and acquisition of sight word vocabulary, the learner has improved a lot as a result of the interventions. The multimodal communication system that was developed for the learner really facilitated growth in both the learner's expressive and receptive communication abilities. As the research shows, implementation of speech-generated devices also helped with verbal language acquisition, and because of his devices, the learner is now able to communicate his wants and needs verbally. One of the biggest differences that was observed with the focus learner is increase use of the words yes and no to answer questions about his wants and needs and even factual questions relating to the academic content in the classroom. There was also a significant increase in the clarity and volume of the learner's verbal communication. After the intervention, communication partners were able to hear the focus learner use different phonemes to pronounce multi-syllabic words, which used to just be mumbles. This is all anecdotal evidence and one of the challenges in this study was figuring out a way to quantitatively record the learner's communication use with each specific device throughout the day. There were a variety of different variables such as the number and type of prompts that were given, the use of both aided and unaided means of communication, as well as the behaviors that were all a part of this study. This may be a reason why the data does not show as much growth as the anecdotal records display. In future

research it will be important to identify all possible variables and develop sound instruments for collecting data prior to the start of the research.

Teacher as researcher or action research is a concept that all teachers, regardless of the population with which they are working, can use. It can be used to determine the effectiveness of a particular academic intervention, as well as to regulate behavior of individual students in a classroom through the use of Functional Behavior Assessments and Behavior Intervention Plans. There is a clear difference between clinical research and action research, and although action research often has a less rigorous design, it has been shown in many situations to lead to student growth and an increase in reflective teaching. Data collection has become increasingly important in all classrooms and one of the best ways to show student growth is by implementing data driven, research based interventions in the classroom. This type of research can and should be done in the applied setting to help teachers continually improve their practice.

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