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**Improving Communication to Reduce Undesired Behaviors in Children with Autism:**

**A Study of PECS versus VOCAs**

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***Chapter I: Introduction***

Alarmingly, the Centers for Disease Control and Prevention (2009) estimate that 1 out of 150 children have some form of autism. Autism is defined by a certain set of behaviors and is a "spectrum disorder" that affects individuals differently and to varying degrees (Autism Society of America, 2006). Without a known cause, autism is considered a developmental disability that requires the use of educational interventions. Of which, the most effective tend to address maladaptive behaviors, characteristic of individuals with autism (Wilczynski, Menousek, Hunter, & Mudgal, 2007). As mandated under the U.S. [Individuals with Disabilities Education Act](http://en.wikipedia.org/wiki/Individuals_with_Disabilities_Education_Act), educators are required to provide the “least restrictive environment” for students with disabilities including autism. In order to provide LRE, educators are faced with the challenge of providing students with autism the interventions that will accommodate their unique needs.

Though autism displays itself differently in each individual, difficulty in communication, including speech and language delays are a common characteristic of children with autism. As a result, deficits in communication development often have behavior issues that may be disruptive in a classroom setting. Since individuals with autism lack the communication necessary to express oneself appropriately, undesired behaviors can be interpreted as a means to express their feelings, such as throwing tantrums or being aggressive (Autism Society of America, 2006). Despite these difficulties, students with autism have great potential to grow and learn with the help of educational interventions. It is important to find appropriate and effective interventions to help students with autism minimize behavior problems and maximize learning. By doing so, students with autism may have more opportunities to better function with their non-disabled peers in general education settings. This type of progress could ideally expand beyond the classroom setting and help these children in social groups and home life with their families. There is no “quick fix” to helping children with autism, but with time and the use of a variety of interventions, solutions for coping with the limitations they have could be found and implemented across schools.

*Purpose of Study*

Autism itself has been a recent diagnosis that is growing rapidly and has a strong presence in K-12 education. As a disability, Autism can bring with it an array of communication disorders, depending where a child with autism falls within the spectrum. Younger elementary children may have growing frustrations that stem from communication disorders and therefore react by lashing out in the form of tantrums or other expressions of aggravation. The connection has been made here that children with autism and their ability to communicate can affect their social behaviors.

Major practices have risen in the educational environment to assist children develop their communication skills. Among these practices are both the use of PECS and VOCAs. Both communication systems have been prominent methods with studies providing evidence for their use with students with communicative disorders, but few that focus on the effects for individuals with a diagnosis of autism. The researchers determined that participation in kindergarten was an important time in a child’s education due to the fact that major communication development occurs at that age, as well as children are introduced to the standards for what is appropriate classroom behavior. In order to fill the gap in research among the uses of this tool, we, as the researchers, ask: Which functional communication system, PECS or VOCAs is most effective in decreasing the amount of undesired behaviors (i.e. tantrums) among children with autism in kindergarten?

*Significance of the Study*

 In conducting this study the researchers hope to demonstrate which communication system, PECS or VOCAs has the most impact to improve the communication and social development in children with autism. If either communication system does indeed contribute to these skills, then even further research can be conducted to see the long-term effects PECS and/or VOCAs with this unique population of children and its connection to their social behaviors over wider periods of time. Even if there is no link made between the use of PECS and undesired behaviors, this study could serve as a bridge for links to be made between these behaviors and other educational instruments.

 Earlier studies on communication systems for non-speaking children have focused on subjects with the broad diagnosis of “developmental delays.” This study serves to specifically examine the effects of PECS and VOCAs on children with autism in order to drive further research looking at the relationship among successful communication strategies and appropriate behavior among children with autism. Both PECS and VOCAs were initially intended to be tools for students with language acquisition disorders, but with the strong link between autism and communicative disorders, the use of these communication systems for autistic-driven treatments only seems natural. Finding the elasticity of educational tools in order to solve educational problems is a major goal of this study desires in the hopes they form meaningful conclusions to improve the lives of children with autism.

***Chapter II: Literature Review***

              In light of the growing number of children with autism, much research has been done to find effective ways to help these students function as their typically developing peers.  Because many of their behavior issues stem from their lack of communication skills, alternative means of communication have been devised to accommodate for their needs.  Two methods for helping students express themselves appropriately are known as Picture Exchange Communication System (PECS) and Voice Output Communication Aids (VOCA).  This chapter serves to review previous literature on PECS, VOCA, and their effects on students with disabilities.

              PECS is a picture-based system that was developed to help students acquire self-initiated language and communication (Bondy & Frost, 2001).  The program includes a communication board and pictures that represent a desired item or activity.  The student is taught to make requests by handing a picture that he wants to his communication partner.  PECS consists of six phases of instruction: how to communicate, distance and persistence, discrimination between symbols, using phrases, answering a direct question, and commenting.  The first four phases focus on teaching the student how to use the pictures to make a request, while the last two focus on discriminating between requests and statements and expanding the student’s range of communication.  Lund and Troha (2008) agree that PECS is an effective system for students with disabilities that should be implemented throughout the instructional day.

              In a study done by Bondy and Frost (1994), they compared the behavior scores of 41 students using PECS through the Autism Behavior Checklist, which is a list of behaviors often displayed by students with autism.  After a year of using PECS, Bondy and Frost found a correlation between the students’ mode of communication and the number of unusual behaviors.  Students who remained solely on a picture system showed a small reduction in their behavior scores; students who used a mixture of both a picture system and speech showed a moderate reduction; and students who used only speech showed substantial reductions.  The study shows that increased speech and communication is correlated with a decrease in behaviors.  Charlop-Christy, Carpenter, Le, LeBlanc, and Kellet (2002) reported similar results in their study on three students with autism.  As the level of communication increased, the researchers found at least a 70% reduction across 10 to 12 inappropriate behaviors, which included disruptions, physical aggression, and tantrums.  In addition, four behaviors were considered to be eliminated.

              Although PECS sounds extremely promising, other approaches to intervention for students with complex communication needs also exist.  A voice output communication aid (VOCA) creates audible [speech](http://en.wikipedia.org/wiki/Speech) or [readable text](http://en.wikipedia.org/wiki/Cleartype) for someone who cannot speak through the use of a computer program known as a speech synthesizer (Bock, 2005).  A VOCA utilizes a graphic-based system providing pre-recorded or programmed speech output in the form of words, phrases, or sentences.  The speech output of VOCA may offer a more natural, understandable system, thereby eliminating communication barriers experienced by graphics-based programs such as PECS.  VOCAs may also enable an individual to evoke attention and communicate a specific response simultaneously, unlike graphic-programs where the communication partner must initiate the conversation (Schepis, Reid, Behrmann & Sutton, (1998).

As with PECS, empirical data supports the use of VOCAs as an effective intervention for children with autism and other communication needs (Bock, 2005).  For example, Romsky and Sevcik (1993) conducted a longitudinal study that documented primary and secondary school-age individuals with moderate to severe intellectual disabilities were able to learn functional communication using VOCAs.  To further examine the effectiveness of PECS and VOCAs, Bock (2005) conducted a study of six 4-year old boys diagnosed with developmental delays who were non-verbal and did not use an augmentative and alternative communication (AAC) system.  An alternating single subject design was implemented in which all of the children participating in the study were exposed to both PECS and VOCAs.  The results of this particular study suggested that acquisition of PECS is achieved at a slightly higher rate than VOCAs.  However, given further training and support, the subjects were able to acquire the necessary skills for utilizing both AAC devices at a similar rate.

Since research has shown associations between communication and behavior problems, it is important to find a communication system that helps students best express themselves.  PECS and VOCAs have proven to be competent in assisting students with communication needs, and teaching students how to express themselves verbally or appropriately may reduce the desire to act out aggressively.  In conclusion, previous research on AAC devices has examined students with various developmental delays.  The primary goal of this study is to focus specifically on children with autism and their response to alternative communication systems that may result in a decrease of undesired behaviors.

***Chapter III: Methodology***

*Subjects*

Subjects for this research study were twelve 5 and 6 year-old students (10 males, 2 females) who have been diagnosed with autism who were non-speaking and who did not use an AAC system to communicate functionally. The students were drawn from two self-contained Special Day Classrooms at the kindergarten level. The school that contained Classroom A (N=6) was located approximately 3 miles from the school that contained Classroom B (N=6). Both schools are situated within the Long Beach Unified School District where the population demographics are as follows: Hispanic or Latino (51%), White (16%), African American (16%), Asian (8.1%), Filipino (3.7%), Pacific Islander (1.9%), and Other (2%). In addition, 80-85% of the students from both schools participate in a free and reduced lunch program. After obtaining permission from school administration, researchers contacted one kindergarten SDC teacher in each of the schools who then identified specific children who meet selection criteria. All twelve children were selected for the study based on three criteria: (a) they were currently educated in a kindergarten setting, (b) they could physically manipulate and visually locate a laminated 2 in. x 2 in. picture, and (c) they were non-speaking and did not use a formal, functional means of communication. Parents were subsequently contacted and signed an informed consent letter.

*Instrumentation*

 In order to compare the effectiveness of PECS to VOCAs among children with autism, classroom A was given the former intervention and classroom B the later. The PECS intervention utilized 2 in. x 2 in. laminated colored pictures with the label of the picture printed above the word. Velcro was attached to the back of the pictures and the pictures were placed on an easel for visual display. The VOCA intervention utilized the GoTalk, a lightweight, digitized AAC device with a built-in handle and nine static locations separated by a keyboard. Velcro was attached to each of the location sites on the GoTalk. Both interventions used the concrete referents to which the pictures correspond (e.g. a picture of a cookie and an actual cookie).

 The dependent measure of this study was the number of undesired behavior. The undesired behavior was operationally defined as engaging in tantrum like behaviors such as screaming, crying, or any violent action. In order to measure the dependent variable, coded data sheets were created for the researchers to monitor student behaviors during observation sessions in both classroom A and B. Baseline data were collected in order to determine each subject’s median occurrence of undesired behaviors prior to the implementation of the interventions. Over a period of eight weeks, the researchers simultaneously conducted one 2-hour observation session for each day of the week at each intervention site. During the observation sessions, undesired behaviors were recorded based on frequency for each subject.

 Inter-rater reliability was assessed during the data collection process by having four individuals independently collect data on a child’s behavior during the period of two hours. The number of agreements was tallied and divided by the number of agreements plus disagreements. Inter-rater reliability was 100%.

*Procedure*

 This research study was a quasi-experimental design in which subjects were selected based on selection criteria and then randomly assigned the intervention treatment using the communication system known as either PECS or VOCAs based on the classroom the student was enrolled in. Prior to the implementation of both communication systems, the classroom teachers and instructional aides were required to attend a two-day training seminar for their designated intervention. Students within classroom A were trained throughout the eight week observation period to utilize PECS as the primary mode of communication. The PECS system was reinforced throughout the entire school day (6 hours) while the students engaged in their normal curriculum. In classroom B, the students were instructed on the proper methods for using the GoTalk devices (a VOCA) and we reinforced to use the devices throughout the school day during normal instruction.

 As previously mentioned, baseline data were collected prior to the interventions implementation. Progress monitoring data was subsequently collected five days a week for eight weeks. One researcher would observe the classroom A from the time of 10 AM-12 PM while one researcher would observe in classroom B at a different location at the same time each day. Six students non-verbal students diagnosed with autism were observed at each site. The coded data collection forms were used to record the number of undesired behavior exhibited by each student during the individual observation sessions.

*Data Analysis*

In order to interpret the data, hypothesis testing will be conducted to determine whether a difference in the frequency of undesired behavior exists among the students using PECS versus VOCAs after a period of eight weeks. If a difference among groups exists, the effect size will be calculated to identify the practical strength of the conclusion about the group differences. In using this method of statistical analysis, it is the hope of the researchers that the results will provide the crucial information regarding which communication system is most effective specifically for children with autism. In conclusion, these data analysis procedures have the potential to help make inferences for the larger population of non-speaking individuals with autism.

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