

2016

Examining aided input intervention in a classroom setting for children labeled with significant disabilities

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EXAMINING AIDED INPUT INTERVENTION IN A CLASSROOM SETTING FOR
CHILDREN LABELED WITH SIGNIFICANT DISABILITIES

An Abstract of a Dissertation
Submitted
in Partial Fulfillment
of the Requirements for the Degree
Doctor of Education

Approved:

Dr. Frank Kohler, Chair

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Dean of the Graduate College

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May 2016

ABSTRACT

The purpose of this research was to examine aided input as an intervention strategy for teaching children language and communication skills through Augmentative and Alternative Communication. This study examined whether a coaching package is effective for enabling teachers to use aided input strategies and also examine the impact of the aided input strategies on children's communication skills. Data was collected for six weeks using the AB alternating reversal design with the last two weeks being maintenance phases without coaching and support. There were three pieces of data collected; student pre and posttests of target words, daily observations of teacher instruction with scoring on a fidelity checklist, and post interviews with the teachers. Results suggest teachers were able to learn to implement aided input through coaching and support. Furthermore, teachers were able to continue implementation with high-quality/fidelity when support is faded. Moreover, when comparing the mean growth of student word identification between the two conditions, a trend appeared higher with aided input having more words acquired than during the standard condition. All three teachers perceived aided input as having a direct impact on the child's language and communication.

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Dr. Frank Kohler, Chair

Dr. Evette Edmister, Committee Member

Dr. William Callahan, Committee Member

Dr. Lindsey Leacox, Committee Member

Jennifer Lynn Flores
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DEDICATION

I would like to dedicate this dissertation to all of the children who struggle on a daily basis to communicate their most basic wants and needs. Your thoughts and ideas are valuable, you count! To the families, who participate in IEP meetings saying, “I know my child understands so much more than they can say.” You are the best advocate for your child, keep trying. To the teachers who understand how important language and communication skills are, continue to collaborate with the experts to implement strategies in your classroom on a daily basis.

I would also like to dedicate this dissertation to my family and friends, who encouraged me in my studies when pursuing a doctorate seemed like a crazy idea. I would especially like to thank my husband and mom who put in long hours so that I could study. And to my son, may you find your passion and pursue your dreams.

ACKNOWLEDGMENTS

This study was made possible through the support of many individuals. First, I would like to thank Dr. Kohler, my committee chair, for his support over the course of this study. His guidance, time, and never-ending support helped me pursue my dream of designing a study that would directly impact classroom teaching practices. Second, I would like to thank the committee members, Dr. Evette Edmister, Dr. William Callahan, and Dr. Lindsey Leacox, for lending their expertise and dedicating their time to the success of this study. Finally, I would like to thank each of the participants in this study. Thank you for opening your classroom and putting in the extra effort to perform and record lessons daily, and being in open communication. Your dedication to student learning and continued professional development is outstanding!

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CHAPTER I

INTRODUCTION TO THE STUDY

Children with complex communication needs present an important challenge to the education system. Children have a right to their voice, and as educators we need to be prepared to assist a child when they are unable to communicate for themselves. These children may have difficulty verbalizing or are unintelligible when they make vocalizations. Their quality of life can be substantially affected when they are not able to communicate their most basic wants and needs, much less share their greatest fears and desires. It is our job as educators to help these children find their voice.

Statement of Problem

Students with complex communication needs demand our very best, however, teachers do not have a wide array of interventions to support their language and communication skills in the classroom. Speech and Language Pathologist have a very limited amount of time to spend with these students. This study hopes to demonstrate an intervention strategy that can be utilized throughout the student's educational day to increase their language and communication acquisition rates. Typically, when teachers learn about a new intervention strategy, it is done through a one-shot professional development session leaving the teachers without support for implementation once they are back in the classroom. This study hopes to explore coaching as a way to support teachers' acquisition and implementation of a new strategy. This study will add to the research base in AAC and coaching.

Significance of the Study

This study adds to the research base and is significant because children with complex communication needs present a challenge to educators. At this point, aided input is beginning to be established as an effective intervention tool for assisting students in the development of language and communication skills. Coaching is also emerging in the literature and in schools as a stronger professional development model versus the one-shot, in-service model to help teachers learn a new strategy and implement with high-quality and fidelity (Kohler, Ezell, & Paluselli, 1999).

The purpose of this study was to extend prior research that has examined aided input in two ways; through coaching and utilization in the classroom setting. First, to examine the coaching model as a way to support teacher learning and implementation of a new instructional strategy. More specifically, could teachers learn to implement an intervention strategy, outside of researchers and clinical settings, in their daily instruction with high-quality and fidelity when given on-going support? Second, to examine aided input intervention outside of a clinical setting to impact students with significant communication needs. There is a significant need for impactful professional development and interventions that improve children's ability to communicate effectively.

Purpose of Study

The purpose of this research is to examine aided input as an intervention strategy for teaching children language skills and communication through Augmentative and Alternative Communication. This study will examine whether a coaching package is

effective for enabling teachers to use aided input strategies and also examine the impact of the aided input strategies on children's communication skills.

Research Questions

This study was designed to address the following four questions:

1. Can teachers learn to implement aided input in a high-quality/fidelity way with coaching and support?
2. Is aided input intervention effective in teaching language skills and communication?
3. When support is faded, can teachers continue to implement aided input with high-quality?
4. What are teachers' perceptions of aided input? Benefits? Challenges?

Conceptual Framework

This study used an AB alternating reversal design to examine the effectiveness of coaching to support teacher implementation of aided input and its impact on student language and communication skill acquisition. Teachers were instructed on the aided input intervention and provided support in implementing in their classroom during the intervention phases. Data was collected for six weeks using the AB alternating reversal design with the last two weeks being maintenance phases without coaching and support. There were three pieces of data collected; student pre and posttests of target words, daily observations of teacher instruction with scoring on a fidelity checklist, and post interviews with the teachers.

Definition of Terms

Augmentative and Alternative Communication (AAC) - is an extensive array of modalities to aid in achieving functional communication for children with complex communication needs. AAC is utilized to either “augment” or supplement current speech abilities or provide an “alternative” to primary speech (Mirenda, 2003).

Aided Input - is achieved through a communicative partner pointing to or highlighting corresponding symbols on the child’s AAC system as they speak.

Organization of the Paper

This paper was organized in five chapters. Chapter I presents an introduction of the study, statement of the problem, significance and purpose of the study, research questions, conceptual framework, definition of terms, and organization of the paper.

Chapter II provides a review of the literature regarding children with complex communication needs, intervention strategies to aid in language and communication acquisition, and coaching as a support to teacher implementation. Moreover, Chapter II provides a summary for classroom implications and research questions.

Chapter III describes the methodology used in this study, including the participants and setting, experimental design and procedures, experimental measures, and reliability procedures.

Chapter IV provides the results of the study, including answering the research questions. Finally, Chapter V presents a discussion of the study, including: summary and

explanation of each research question, limitations and recommendations for future research, and conclusions.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

Communication is a powerful part of a person's life. A person's ability to effectively communicate leads to learning and development (Beukelman & Mirenda, 2013), control within their life (Blackstone, Williams, & Wilkins, 2007; Soto & Zangari, 2009), meaningful participation in society (Beukelman & Mirenda, 2013; Blackstone et al., 2007; Romski & Sevcik, 1996), and projection of true self (Blackstone et al., 2007). Unfortunately, approximately 4 million Americans cannot meet the communication needs of their daily lives through natural speech (Beukelman & Mirenda, 2013). When this occurs they may face severe restrictions in their lives.

Description of the Student

Children labeled with significant disabilities often lack functional communication skills. They find it difficult to communicate even the simplest things such as wants, needs, initiating conversations, asking and answering questions, making eye contact and more. They may become adult dependent to have their needs fulfilled or passive learners because it is difficult for them to participate. Children with limited communication may resort to problematic behaviors such as tantrums and self-aggression to express their needs (Durand & Merges, 2001). Not being able to communicate functionally has a direct negative impact on success in family and school activities. It affects the child's ability to learn and may be resistant to teacher efforts and they may struggle to develop meaningful

relationships with others. When children lack verbal skills these problems are magnified. In some cases addressing these needs can be a significant challenge for practitioners.

The role of the teacher and support staff is often to delineate the appropriate instruction and goals to aid the student in closing the achievement gap. Determining the best route for a student is difficult because the field of educational research is so large and a deficiency in one sub-skill may be intertwined with another, like behavior and communication. Those trained in communication, SLPs or Speech and Language Pathologist typically work with a student only a small fraction of the week and are with the teacher and support staff 75 to 80% of the day. Students with significant communication disabilities typically have a large team of support staff from teachers, SLPs, Para Professionals, Behavior Specialist, Assistive Technology Coordinators and more. Typically support staff have very little training in addressing communication needs. SLPs often consult with the teacher and hope the skills transfer to the classroom but with the deficits being discipline specific it leaves the students' needs largely unmet. This research study attempts to address the challenge to provide services in the area of language and communication in the classroom to have a more substantial impact.

Augmentative and Alternative Communication

One way to address the need of children with significant speech and language disabilities is through Augmentative and Alternative Communication (AAC). AAC is an extensive array of modalities to aid in achieving functional communication for children with complex communication needs. AAC is utilized to either “augment” or supplement

current speech abilities or provide an “alternative” to primary speech (Mirenda, 2003). Modalities in which communication is achieved fall into two categories aided and unaided. Unaided communication lies within the body; gestures, facial expressions, and sign language. Aided communication relies on a tool beyond the person’s body; ranging from low-tech systems such as line drawings and pictures to high-tech computerized devices (Johnston, McDonnell, Nelson, & Magnavito, 2003). However, picking a modality does not ensure success with functional communication, teachers and support staff must also select the effective intervention strategy to teach how to use the AAC (Johnston et al., 2003). Effective intervention strategies fall on a continuum from highly specialized such as discrete trial to very informal like naturalistic teaching. While AAC serves to either supplement or replace a child’s verbal language it may also foster speech development.

Intervention Strategies

Below describes three particular AAC interventions that could be used by practitioners to assist students with complex communication needs in developing functional communication: Picture Exchange Communication System (PECS), Sign Language, and Aided Input.

Picture Exchange Communication System

Method. Bondy and Frost originally designed PECS as a type of AAC to increase spontaneous communication and was based on the research from B.F. Skinner’s “verbal operants such as mands, tacts, intraverbals, and autoclitics” (Bondy, Tincani, & Frost,

2004). Mands is derived from the words command or demand in which a person communicates an idea of what they need or want. Often times, children communicate the need for food or to play with a specific toy. Teaching “mands” first is motivating for children with Autism Spectrum Disorder (ASD), because it is self-motivating instead of tacts (labeling) which is socially reinforcing (Bondy & Frost, 1994). In order to be considered PECS the six highly specified and data driven phases must be followed. The phases gradually build from the child learning to exchange one picture for a desired object, with possible hand over hand prompting, to building sentence structure, and responding to questions. PECS protocol calls for two adults to support the child in prompting and receiving the request and teaches the child to become independent and initiate through expectant delay and most to least prompting.

Effectiveness and potential for generating language. Since the development of the Picture Exchange Communication System, or PECS in 1985, many research studies have been conducted to measure the effectiveness. In one meta-analysis of 16 single-participant studies on PECS demonstrated an increase in communication skills for 44 participants. Participants in the study ranged in age from pre-k through adult and were labeled with “Autism Spectrum Disorder, PDD-NOS, nonspecific ‘developmental delays,’ mental retardation, seizure disorder, Down syndrome, blindness, cerebral palsy, and expressive and receptive language disorder” (Tincani & Devis, 2011). Although PECS was originally developed for children labeled with ASD this synthesis showed that PECS can also be an effective AAC system for people with other diagnosis.

PECS has many desirable traits, one has already been mentioned; it starts with “mands” and therefore is motivational to the child. Another benefit is the universality of pictures (Tincani, 2004). The child and the person receiving the message does not need to learn another language because they can see the visual representation of what the child is communicating. Children with ASD and other developmental delays also tend to be visual learners making PECS a highly viable option. Also, PECS requires few complex movements, with the child only needing to grab and release a picture, and is low cost (Charlop-Christy, Carpenter, Le, LeBlanc, & Kellet, 2002). While PECS was designed as an alternative form of communication many studies have shown speech acquisition to be a positive side effect (Bondy & Frost, 1994; Tincani, Crozier, & Alazetta, 2006). Also, the exchanging of pictures teaches two important factors in communication; gaining the listeners attention and communication occurs between two or more people. Often, when children are taught simply to point to a picture they do not realize they need to gain the person’s attention who they are talking to. The “listener” may miss the message because the child could point to a picture without them looking. This does not occur when the child is instructed through PECS because they need to gain the listener’s attention to exchange a picture and essentially communicate their message.

Sign Language

Method. Sign Language has been used as a form of unaided communication for children with significant disabilities. Unlike PECS, Sign Language does not follow a specific protocol when instructing. It is the instructor’s decision to choose the intervention strategy. In Tincani (2004), a comparison study of PECS and Sign Language

the researchers adapted the PECS protocol as an intervention strategy for Sign Language. They started with the stimulus preference assessment and then moved into an imitation assessment. The imitation assessment consisted of “27 hand, arm, and finger movements that were similar to those required to perform sign language” (Tincani, 2004). Then, baseline was taken to be sure the child was not able to request the items with pictures or sign language prior to training. Baseline was followed by an alternating treatment design. The PECS protocol along with correspondence probes were followed through the third phase. Sign Language treatment sessions were performed similarly to PECS protocol in that there were two adults present to facilitate communication. The communicating partner held up the motivating item and instead of the prompter helping facilitate grasping and reaching for the picture they helped form the sign. Immediately after forming the sign the child received the preferred item. Prompting was faded as the child’s skill in forming the sign increased to independence. The child was scored independent when they were able to “mand” for an item without any adult physical prompting.

Effectiveness and potential for generating language. In a study comparing the effects of PECS and Sign Language two students were taught both modalities and then the appropriate modality was selected based on the student’s achievement data. One student found more success using sign language the other with PECS. Results show that both students vocalized more when using sign language as a modality however, PECS states specifically the goal of PECS is not vocalizations, however, it may be an added benefit of utilizing PECS (Tincani, 2004).

As observed in the study above, the two students vocalized more when utilizing sign language. Although the goal of AAC is not speech, it may be an added benefit. Another benefit to sign language is that “manual signs are more portable, more permanent, and more readily used at a distance from the listener” (Mirenda, 2003). The child’s hands are where ever they are and they do not have to carry around an extra device or make sure it’s charged. Sign Language also has “natural communities of users” (Mirenda, 2003) unlike speech generating devices or PECS. A child using sign language may find comfort in the Deaf and hard of hearing community.

Aided Input

Method. Four intervention strategies fall under a large umbrella known as "aided input." Modeling, is the basis of interventions and research studies using aided input have been conducted across a wide range of children and disabilities, in various settings, time-frames, and group size (Beukelman & Mirenda, 2013; Blackstone et al., 2007; Cafiero, 2001; Dada & Alant, 2009; Drager et al., 2006; Goossens’, 1989; Ronski & Sevcik, 1996;). Some studies are done in clinical settings while others are done in the classroom or an intervention room in the school. They may be done from one hour per week to several hours a day and in group sizes of a classroom at story time, small group during stations, or individually.

The four aided input strategies are; Aided Language Stimulation (ALS), System for Augmented Language (SAL), Natural Aided Language (NAL), and Aided Language Modeling (ALM). Aided input is achieved through a communicative partner pointing to

or highlighting corresponding symbols on the child's AAC system as they speak. Just like a mother modeling for her toddler how to form a sentence, the communicative partner demonstrates how to form a sentence using the AAC system while speaking. The partner may also, slow their rate of speech, use fewer words, add pauses, and expand the child's message (Goossens', 1989). Through modeling, aided input facilitates receptive language comprehension and expressive communication. So, not only does the intervention teach how to use the AAC, it also teaches language. Children begin to see the power in their AAC system, and it as a vehicle for communication (Sevcik, Ronski, Watkins, & Deffebach, 1995).

Effectiveness and potential for generating language. Dada and Alant (2009) in a study designed to use ALS, Aided Language Stimulation, as an intervention strategy for a small group of students who had limited spoken vocabulary. The 4 students were selected to participate because they spoke fewer than 15 intelligible words and were within the age range of 8 and 12 years old. The intervention was held in a school intervention room over the period of 3 weeks between 15 and 25 minutes per day. Three different activities were selected, one activity per week, to incorporate ALS. During the chosen activities, craft project, making pudding, and story time, the interventionist used a picture communication board to point to symbols as she spoke to the students. There were 16 core vocabulary symbols used across the activities and 8 target vocabulary symbols matching the activity. All four students showed significant growth in vocabulary acquisition and maintained even after ALS ceased. The researchers believe the nature of ALS as a social intervention leads to enhanced learning. They also cite the experience-

based activities allowed the students to fast map to learn the new vocabulary. In other words, as the child experienced an unknown word and had a direct association with an object they were able to map the two together for language acquisition.

A two-year study conducted by Sevcik et al. (1995) examined the use of SAL, System for Augmented Language, in both the home and school settings. Thirteen male youth with a mean age of 12 years 4 months were chosen to participate in the study. The students were considered to have moderate to severe intellectual disabilities with a spoken language of approximately 10 words or less. Each student was paired with an adult to provide SAL consistently during the two-year study. Adult communicative partners were taught how to conduct SAL, operate the speech generating devices, and integrate the devices into conversations. Over the two-year-period, there were follow up support sessions for partners to ask questions as they arose. The group of students were divided into half and either received SAL instruction during meal time at home or meal time in school. SAL was used in preparing for the meal, during the meal, and cleanup. Symbols were added gradually as the students passed comprehension criterion probes. Researchers purposefully chose lexigrams so the youth were unfamiliar with the symbols, and therefore all had baselines of zero. By the end of the study, the mean number of symbols each student had access to was 40.6 with a range of 35-44 symbols. The results of this study, showed 4 students had a slow acquisition rate of less than 20 symbols on the comprehension probes whereas the other 9 students had rapid acquisition rate of comprehension with at least 35 symbols and skills such as symbol combinations and printed word knowledge.

Conclusions and Guidelines for Practitioners

Many children with disabilities exhibit difficulties with language and communication skills. Once teams have analyzed and examined the needs of the student, they can begin to teach a child to use AAC as an effective form of communication. The literature suggests three methods are effective for teaching communication; PECS, Sign Language, and Aided Input. Each method has its potential for creating spontaneous communication with potential for limitations. It is up to the practitioner to decide which method is most appropriate for the child.

Strategies to Support Teacher Intervention

Coaching has emerged in literature and in schools as a way to address professional development needs. Coaching developed in large part due to growing dissatisfaction with the effectiveness of one shot in-services for supporting teachers' expertise and practices in the classroom (Yoon, Duncan, Lee, Scarloss, & Shapley, 2007). Showers (1985) stated that "coaching provides a structure for the follow up to training that is essential for acquiring new teaching skills and strategies" (p. 44). Kohler et al. (1999) elaborates by saying, "Peer coaching enables teachers to collaborate in developing, implementing, and refining practices that maximize student outcomes" (p. 154).

There are multiple kinds and elements of peer coaching depending on the need. Peer coaching can be done with an expert coaching a teacher or reciprocal coaching where "two teachers observe each other and exchange feedback in an alternating fashion"

(Kohler et al., 1999). Several essential elements of coaching are; initial highly engaged training, collaborative planning, observation(s) with optional modeling, and focused feedback or sharing (Kretlow & Bartholomew, 2010; National Center on Quality Teaching and Learning, 2014). This can be achieved through small group professional development sessions with interactive modeling and practice by the participants. Follow-up observations can be performed with just one observation to multiple over an extended period of time with feedback focused on data.

A considerable amount of research indicates that peer coaching is effective for producing changes in teachers' practices and "promoting high fidelity of evidence-based practices from training settings to real classroom settings" (Kretlow & Bartholomew, 2010). Research suggests that expert and peer coaching is effective for addressing a wide range of teacher practices, including their implementation of direct instruction to address children's reading comprehension (Jager, Reezigt, & Creemers, 2002), strategies to increase active responding and learning of kindergarten math content (Kretlow, Wood, & Cooke, 2009), teachers' implementation of Classwide Peer Tutoring to teach spelling in fourth grade classrooms (Maheady, Harper, Mallette, & Karnes, 2004), teachers; implementation of systematic prompting to address children's IEP objectives (Peck, Kellen, & Baumgart, 1989).

In summary, an ample body of research reveals coaching is effective in enhancing teachers' implementation of practices to address student learning and other outcomes. Two individual studies that utilized peer coaching with positive effects on teacher behavior and student outcomes are described next.

The first study, published by Hsieh, Hemmeter, McCollum and Ostrosky (2009) applied a coaching model with five Midwest preschool teachers to employ emergent literacy techniques in the classroom. Through a cyclical coaching process of collaborative learning and planning, to practice, observation, and feedback, with the support of a booster session if needed teachers learned about implementing three literacy strands (oral language, alphabetic code, and print knowledge). For each literacy strand, teachers engaged in learning about the outcomes, teaching strategies with examples, and planning for implementation. Then, the teacher would practice in their classroom, be observed 2 to 3 times weekly, and be given specific direct feedback. Feedback pertained to a checklist of strategies used for instruction of the literacy skills. If implementation was low, a “booster” session with the coach was provided to clear up any misunderstandings and provide further examples. When the criterion of 80% was reached, the coaching process would start over with the next literacy strand until all three strands were covered. The results indicate, through this process, teachers increased in their knowledge and implementation of literacy strategies and were able to maintain or stay higher than during baseline. Teacher perceptions indicated they increased their knowledge of literacy instruction. All teachers rated the intervention as excellent in making an impact on literacy skills. They also rated the quality of training and the coaching component as 9.8 on a 10 point Likert scale (with 10 being excellent).

The second study, by Filcheck, McNeil, Greco, and Bernard (2004) employed a coaching model to impact student behavior in a preschool classroom. The classroom of 17 students, one teacher, and an aide, was described as being behaviorally “out of

control” (Filcheck et al., 2004). The teacher was coached on three different strategies to impact behavior over the course of the study; the leveling system, praising children, and a timeout procedure for noncompliance. Coaching transpired through “didactic training, in-room coaching, modeling, and immediate feedback” (Filcheck et al., 2004, p. 355). An integrity checklist assisted in providing daily feedback along with verbal feedback on skills to improve. When implementation was low, the coach modeled the skill in class as a way to raise understanding and skill level. Through this study and coaching, the teacher developed behavior management skills that decreased the number of inappropriate student behaviors.

Summary

Coaching is a “a promising practice for promoting high fidelity of evidence-based practices from training settings to real classroom settings” (Kretlow & Bartholomew, 2010, p. 293) through engaging instruction, observation(s), and specific feedback teachers are able to learn and implement strategies with high quality and fidelity. While numerous studies demonstrate the effectiveness of coaching in many areas, an area to be explored is the use of coaching to impact student language acquisition of students who use AAC. The present study looks to address this gap by combining what is known about language and communication interventions for those with significant disabilities and what is known about educating teachers to use interventions with high quality and fidelity. More specifically the purpose of this study is to examine aided input as an intervention strategy for teaching children language skills and communication through Augmentative and Alternative Communication. This study will also investigate whether a coaching

package is effective for enabling teachers to use aided input strategies and also examine the impact of the aided input strategies on children's communication skills. This research is designed to answer the following questions.

Research Questions

This study was designed to address the following four questions:

1. Can teachers learn to implement aided input in a high-quality/fidelity way with coaching and support?
2. Is aided input intervention effective in teaching language skills and communication?
3. When support is faded, can teachers continue to implement aided input with high-quality?
4. What are teachers' perceptions of aided input? Benefits? Challenges?

CHAPTER III

METHODOLOGY

Participants and Setting

In preparing for this study, predetermined criterion was set for participation.

Below is a list of the criterion along with descriptions of the participants and setting:

- The participants were special education teachers (pre-kindergarten to 5th grade)
- Each teacher worked with a student (age 3-12) who used an AAC system as part of their daily communication and had an IEP with language/communication goal(s).
- The participants had regular attendance and would be able to participate for the entire length of the study.

From this criterion, three teachers with three students were selected to participate. None of the teachers had prior training in aided input.

Teacher 1 taught for 7 years in a behavior classroom where approximately 11 students received social skill instruction. Some of the students also attend the classroom for reading, writing, and math instruction throughout the day. The teacher had extensive experience working with children with language and communication needs. She had taught students with articulation goals, brain injuries (significantly impacted their language development), non-specific language processing disorders, selective mutism, language disorders significantly impacting syntax, students with social needs impacting pragmatics, students who stutter due to high anxiety, students who are non-verbal with a diagnosis of autism, and a student who was deaf and used an interpreter.

She used many strategies to instruct students with language/communication needs from scaffolding instruction, changing the way a question or command is worded, or pausing to allow for longer processing time. In addition to verbal strategies, she uses as many visual supports as she can with students when it is clear they are confused; putting up a finger for each step in a multi-step direction, sketching to describe a situation, sequencing with pictures, looking up a photo of an unknown word, or writing what she is saying. She has also trained in and uses STAR (Strategies for Teaching Based on Autism Research) and TEACCH (Teaching Expanding Appreciating Collaborating Cooperating Holistic) curriculums which have language components. She has also informally used PECS (Picture Exchange Communication System) to aid students in communication.

Teacher 1 worked with the student chosen for this study for 1 year in kindergarten. The student spent approximately 83% of her day in general education and 17% in special education (including specially designed instruction in reading, math, social skills, and speech instruction). She received instruction in small group or 1:1 with great amounts of repetition using discrete trial. She also attended a general education classroom with accommodations for reading, science, and social studies, and also participated in specialist, lunch and recess with her general education peers.

Student 1 is an English as a Second Language Learner. She has a genetic disorder with a mutated gene that impacts physical and cognitive development. She uses verbal speech with limited vocabulary and intelligibility. When struggling to be understood, she then uses a dynamic speech output device. She prefers to speak and be understood over using a device. The device aided her in learning new vocabulary, forming sentences, and

modeling words so she could then say them. She also uses gestures and facial expressions to communicate. She expresses a sense of humor and enjoys teasing adults. The student is learning to initiate and maintain a conversation with adults and peers. She likes the support of voice output when practicing with the device and will play around with it by pushing words and repeating them over and over.

Teacher 2 has taught children with significant disabilities for 19 years. She uses a holistic approach to help her students develop language and communication skills. Some of her strategies include sign language, gesture cues, PECS, picture/word schedules, partner assisted scanning, switch access, and adaptive materials for literature.

Student 2 had worked with teacher 2 for 2 years. At the time of this study, the student was a first grader who required the assistance of a full day nurse, a ventilator, tube feedings, and adaptive equipment to meet his physical needs such as: limited head, eye, and hand and leg movement. Student 2's participation in general education ranges from 0-48% of the day due to illness. During the study there were two educational settings: home and school. The first part of the study occurred in the home because the student was on "homebound" instruction due to his complex health needs to limit and prevent exposure to increased illness within the school and community. Homebound instruction was 1:1 with the nurse present.

When released from homebound instruction, the student attended school in a special education classroom with three other students with significant multiple disabilities. Students in the classroom received specially designed instruction in the areas of mobility, communication, pre-academic, and daily-living skills. Student 2 also

attended a general education classroom with accommodations for whole-group reading, small-group reading, and social studies. He also participated in music, art, gym, assemblies, and recess with general education peers. When he was restricted to the special education classroom due to illness within the school building, an ipad was used to include him in small group-reading, peer reading, music, art, and gym.

Student 2 has a much higher receptive vocabulary than expressive. He is non-verbal and uses his affect, face turning red, and behavior to communicate. He knew and spontaneously used 20 modified signs. He also used his hands to indicate a choice between two options by lifting one hand off his lap-tray versus the other. He could indicate “yes” through a head nod. Student 2 utilized several different AAC devices depending on the activity and what he wanted to express. Sometimes he used a big mac switch programed with 2-7 choices. He continually activated the switch to hear all of the message choices. Upon hearing the choice he wanted, he used another single-step switch to activate “I want this one” as his selection. Similarly, he also used partner assisted scanning; especially with letters. The teacher would verbally give choices while showing a visual of the choice. The teacher provided wait time, and he used his selection switch to make a choice. "I want this one." Other times, he used a dynamic speech output device with two-step auditory scanning. (Two-step auditory scanning is a process of using two switches to navigate through the different symbol choices to select the desired response. The first switch is pressed repeatedly to hear the different symbol choices and the second switch is used to select the chosen symbol indicating his response.) He was learning to

use AAC to express his wants and needs, gain attention, initiate conversation, ask for “help,” and to communicate academically.

Teacher 3 taught early childhood for 15 years. During the time of the study, her classroom consisted of 26 students (half day community kids and full day students who are entitled with a 10 to 8 ratio). Eight of the students had IEPs with varying needs including: reading, math, fine and gross motor skills, social skills, vision, and speech. She had worked with a wide variety of students with language and communication needs from those with mild articulation difficulties to students who needed augmentative and alternative forms of communication.

Teacher 3 had attended a wide range of professional development sessions in the area of language and communication. She had learned to implement many techniques such as; PECS (Picture Exchange Communication System), Sign Language, and the use of low tech AAC to adapt curriculum and the classroom to include students with communication needs. Because of her learning, she reports, she has formed a positive attitude to trying new, “out of the box” ideas for communication.

Teacher 3 worked with Student 3 for 3 years in an inclusive preschool classroom. In the inclusive preschool classroom, about 56% of the day was designated as general education and 44% of the day as specially designed instruction where the student is only removed for speech and occupational therapy. She received specially designed instruction in math, reading, social language skills, speech, and fine motor skills. When learning a

new skill, she required small-group instruction with fewer distractions in the environment.

This student had a much higher receptive vocabulary than expressive vocabulary. She was verbal and used speech as her first mode of communication. She would get frustrated when she was not understood the first time. Although speech was her preferred method of communication she had limited intelligibility and would use gestures, facial expressions, or a dynamic speech output device when others failed to understand her. She was learning new vocabulary, to form sentences, and to use her device as a model for speech. She was also learning to initiate and maintain a conversation with adults and peers.

The fourth adult participant in the study was the primary researcher. At the time of the study the researcher had 9 years of experience in education. The first 6 years the researcher was a teacher for children labeled with significant disabilities, followed by 2 years as a general education coach, and at the time of the study a year as a special education coach. As a teacher for children with complex communication need, the researcher worked to address communication skills as a way to decrease negative student behaviors. The researcher had training in PECS and utilized in her classroom along with collaborating with SLPs to implement AAC for students with complex communication needs. She also took a couple of assistive technology classes which highlighted different AAC methods. In her graduate studies, she learned about using aided input as an intervention strategy paired with AAC and researched it in depth prior to the current study.

Experimental Design and Procedures

Phases

The study design used AB alternating reversal, over a 6 -8 week period, to examine 2 conditions. The first condition, baseline, included the teacher implementing their existing practices when teaching a child who uses AAC. The second condition, intervention, included the teacher implementing aided input strategies when teaching a child who uses AAC. Each teaching session lasted approximately 10-15 minutes daily. The teacher alternated between the 2 conditions, 3 times each, for a total of 6 weeks.

A maintenance phase was included to determine if the use of the strategies could continue once the coaching support had been withdrawn. The same data was collected during the maintenance phase. The only difference being that teachers did not receive coaching during this phase.

Training and Support

Training and support occurred in phases to aid teachers with implementation. Two initial training sessions were conducted with each one lasting approximately an hour. The first training session focused on the study and what was needed to participate. The teachers learned about the AB alternating reversal design of the study, the time line of the study, about giving pre/posttests, and videotaping the lessons. They were given a brief introduction to “aided input” by understanding they would be modeling language using the child’s device during instruction. The teachers learned the difference between “core” and “fringe” words and why they are important to AAC users.

The second training session focused on aided input and how to implement. Teachers learned that aided input is a modeling strategy where they speak and simultaneously point to a picture or symbol on the child's communication system therefore *inputting* the message. They learned about facilitating receptive language comprehension, the power in using the child's device, the importance of a robust vocabulary, picking motivating topics, and communication strategies (expansion, pausing, slowing rate of speech, etc.).

At the second training session, they also learned how to use aided input within their typical instruction. The teachers were given a tool to help plan for instruction, in using and modeling the targeted words (core and fringe), and different language functions in each lesson (see Appendix B). The planning tool outlined the core and fringe words and helped the teachers identify what they were going to say. It also helped them identify which language function they were using and which words they would use the device to do aided input. For example, the fringe word may be "cloud" and the teacher may plan to say, "Look at the gray cloud, it looks like it will storm!" In using the planning tool, the teacher may identify the sentence as having two functions; initiation and comment. The teacher may plan to use aided input with the words "look" "cloud" and "storm." The planning tool would provide a road map for using aided input within instruction. The training sessions were followed up with feedback in weeks 1-4 through email and phone calls to help support implementation.

The first week, baseline, teachers were told to instruct as "normal" in a subject area of their choice. Each teacher choose a different subject area to use for this study.

Even though the teachers chose different subjects, their lessons were similar in baseline week because they typically did not touch the child's AAC device while instructing. During baseline week they also had to prepare for the first week of aided input. Support for planning came through phone calls and emails where teachers were able to ask clarifying questions about aided input and how it could be implemented within instruction. Help was given to pick out fringe words related to their lessons, how to program the device, where the symbols should be located, and how to access vocabulary. As the study progressed, communication turned from supporting planning for aided input within instruction to feedback and how aided input was being used with instruction. Teachers were informed during the first two aided input conditions as to the amount of time they were using aided input in their lessons, the number of core and fringe words they were using, and the different functions they modeled. The researcher was able to support the teachers if they needed help increasing their implementation in any of these areas. Feedback was timely because videos of the sessions were turned in daily and helped teachers continue or make changes for the following day. In the final two weeks of the study, the teachers were told feedback from the researcher would decrease. They were asked to please contact the researcher with any questions they may have in the final two weeks.

Experimental Measures

Data was collected on three different measures. First, a fidelity checklist was used to determine if teachers were able to implement aided input with high quality. Second,

pre and posttest was used to determine if there was a difference in language acquisition.

Third, a post-study interview was conducted.

Measure 1: Analyzing the Quality Plus Fidelity of the Instruction

In order to provide support to teachers and determine if aided input could be implemented effectively, a fidelity checklist was created (see appendix A). Items on the fidelity checklist were broken into two strands. The first strand of items should be seen in any quality lesson when instructing a child who uses AAC to communicate:

1. Instruction was delivered in accordance with the respective week.
2. Lesson and materials were prepared and ready for instruction.
3. The AAC system was present and in close proximity.
4. Fringe words were relevant to the activity and available on the device.
5. Teacher actions (acknowledges communication attempts, reiterates child's communication, and expands or clarifies child's communication).
6. Teacher allowed opportunities for the child to communicate during the lesson.

These items should be seen throughout the course of the study no matter the instruction (math lesson verses vocabulary instruction) or design (standard procedure verses aided input).

The second strand of items pertained specifically to aided input:

7. Teacher used aided input to model their communication.

8. Teacher used aided input with core and fringe words (does not count prompting child to use symbols).
9. Language modeled through aided input had different functions (does not count teacher verbally modeling functions).

These items specifically measure aided input implementation. If teachers followed protocol and returned to the standard procedure, they would score low on these items.

These items were helpful in providing feedback to the teachers.

Measure 2: Examining Student Language and Communication Acquisition

Data was collected on student language acquisition through the use of pre and posttests. Pre and posttests were given on the core and fringe words at the beginning and end of each week. Core words (no, it, that, what, and on) stayed the same throughout the entire length of the study while fringe words were changed weekly based on the student and the lesson. Each child had their device with words pre-programmed, and the teacher directed the child to “find the word.” Each child was required to independently locate the words without any cues.

Measure 3: Post Study Interviews

Teacher perceptions and satisfaction data was collected through a post-study interview. Questions were as follows.

1. To what degree do you believe aided input was effective in teaching communication/language skills?

2. Was aided input more effective than what you were doing during baseline/typically?
3. What do you see as the benefits of aided input?
4. What do you see as the challenges of aided input?

Reliability Procedures

Reliability was assessed for Measure 1 and Measure 2. Two observers completed a fidelity checklist while independently watching 20% of the lessons and pre and posttest. Then, reliability was determined by taking the scores of the fidelity checklist; dividing the total number of agreement plus disagreement by the total number of agreement and multiplying by 100. First, agreement on Measure 1, fidelity checklist, averaged 91% with a range of 89% to 93%. When looking at item 7 on the fidelity checklist, teacher used aided input to model their communication, averaged 80% with a range of 60% to 100%. Item 7 had lower interrater agreement for two different reasons, the cut-off point and the definition of aided input. First, during two of the lessons, the researcher and reviewer scored the amount of aided input modeled during a lesson near the cut-off point around the 50% mark causing lessons to be scored differently. Second, the researcher and reviewer had different definitions of “aided input.” One time, a teacher used picture cards to “input” or model language and the researcher counted it on item 7 as 1 point. The reviewer did not count it as “aided input” because it was not done on the child’s device and scored 0 points for using aided input to model language during a lesson. Item 8, teacher uses aided input with core and fringe words, reliability averaged 93% with a range of 80% to 100%. On item 9, teacher models different language functions, averaged

93% reliable with a range of 80% to 100%. On Measure 2, pre and posttest, reliability averaged 87% with a range of 80% to 93% agreement.

CHAPTER IV

RESULTS

This study was designed to examine an intervention strategy for teaching children language and communication skills through AAC and what it takes to foster quality implementation by teachers. The study used AB alternating reversal phases to examine the two conditions (baseline and standard procedure) and from the three measures, tried to answer the following questions:

1. Can teachers learn to implement aided input in a high-quality/fidelity way with coaching and support?
2. Is aided input intervention effective in teaching language skills and communication?
3. When support is faded, can teachers continue to implement aided input with high quality?
4. What are teachers' perceptions (benefits and challenges) of aided input?

Measure 1: Analyzing the Quality Plus Fidelity of the Instruction

A fidelity check list was created to determine if aided input could be implemented effectively (see Appendix A). The fidelity checklist consisted of nine items. Six items pertained to any quality lesson and three additional items pertained to when aided input was being implemented. Lessons were videotaped and scored according to the fidelity checklist. No score was given if there was a video error because the researcher could not hear or see the video to assign points, and the day is recorded as having no data. If the

lesson did not occur because of a field trip or absence, the day was not recorded, and is accurately reflected in the figures below as a shortened week.

There were three items on the checklist specific to aided input: percentage of language input, targeted words modeled, and multiple language functions modeled. If teachers were able to implement aided input effectively, they would score higher on the fidelity checklist during this condition. If teachers followed the study design and returned to standard procedure, they would score zero points on these items.

Each teacher learned to implement aided input in a short amount of time and alternate between the two conditions (see Figure 1 below). Teacher 1 had the most variability on the fidelity checklist and scored anywhere from 17 to 26% higher when implementing aided input compared to standard procedure. Teacher 2 gained 20 to 24% during aided input weeks, and Teacher 3 scored 28 to 30% higher than during the standard procedure condition.

Figure 1 also demonstrates each teacher's growth in skill level when implementing aided input over the course of this study. Teacher 3 demonstrated the highest levels of implementation according to the fidelity checklist, starting at 92% of the points possible in the first aided input week and continuing with 94% of the points possible in the remaining two aided input weeks. Teacher 2 began with 84% of the points possible in the first aided input week and continued with 88% of the points possible in the following two weeks. Teacher 1 scored the lowest at 74% of the points possible during the first aided input week but made the most growth with earning 7 more percentage

points possible, finishing with 81% of the points possible in following two aided input weeks.

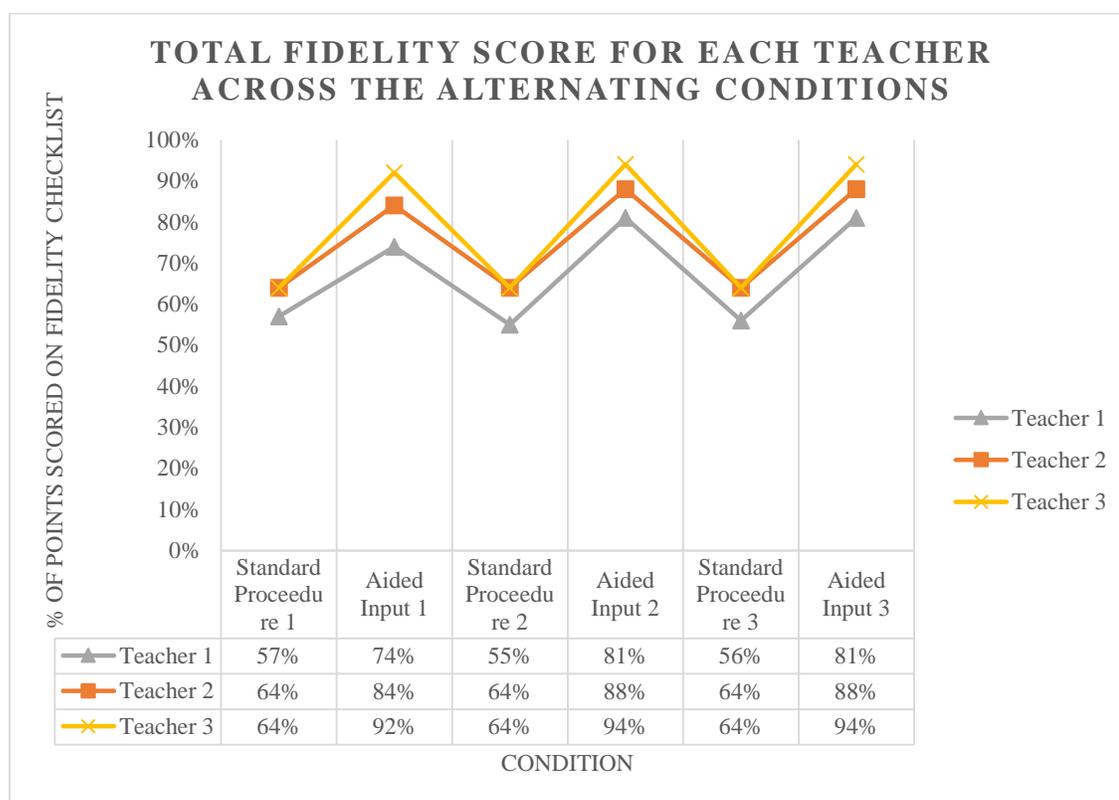


Figure 1: Total Fidelity Score for Each Teacher Across the Alternating Conditions

During the final two conditions, support was faded to see if teachers could maintain quality implementation. Figure 1 shows that each teacher maintained the intervention when support was faded. All three teachers held the same high percentage score in the final condition as they had in the previously supported aided input condition.

Each teacher's fidelity scores are shown in Figures 2-5 below. The first item directly related to aided input was the percentage of the session the teacher used the device to input language. A score of zero points indicates aided input was used during 0% of a lesson. One point represents aided input was used for 1-25%, 2 points for 26-50%, and 3 points for 51-100% of the lesson. For example: If a teacher said 100 sentences during their lesson and 53 of the sentences had at least one word modeled or *input*, they would score 3 points.

Teacher 3 scored the highest with 51-100% of each lesson presented with aided input. Teachers 1 and 2 showed partial implementation. Teacher 2 increased in skill as the study progressed from using aided input for 1-25% of the lesson to 26-50%. Teacher 2 also had a difficulty returning to baseline in the third standard procedure phase and scored 1 point three times before returning to zero. Teacher 1 showed the most variability in scoring between 1 and 2 points throughout each aided input phase.

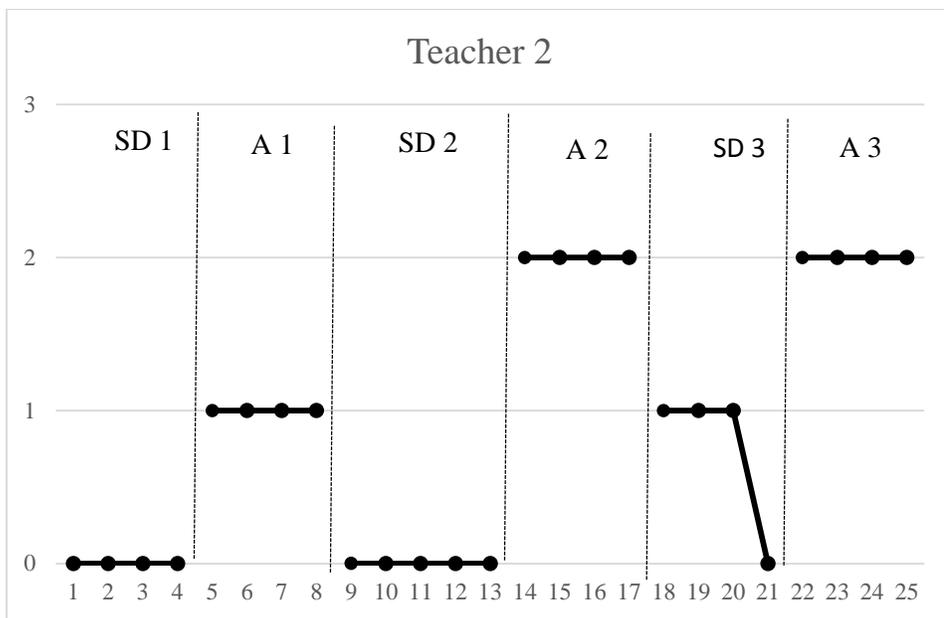
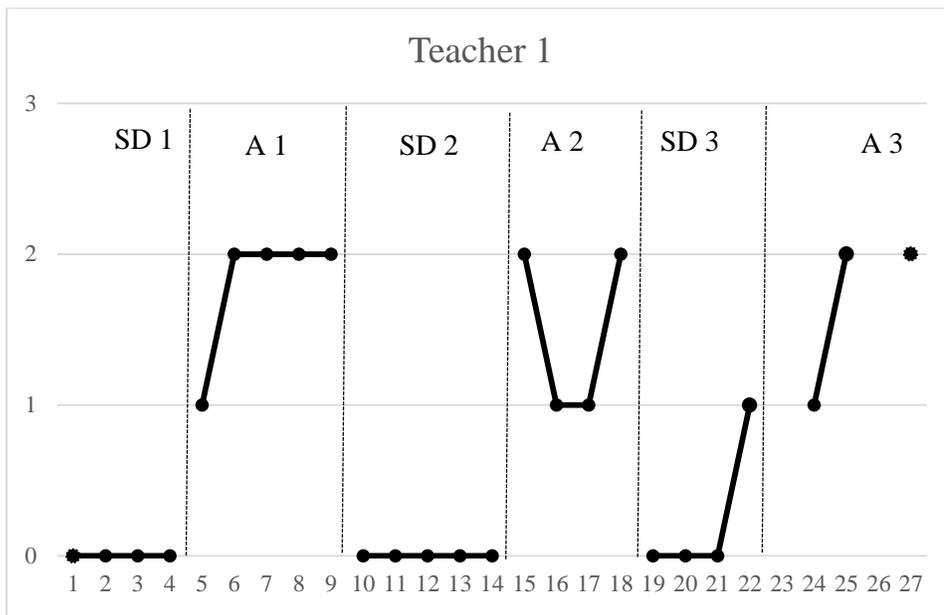


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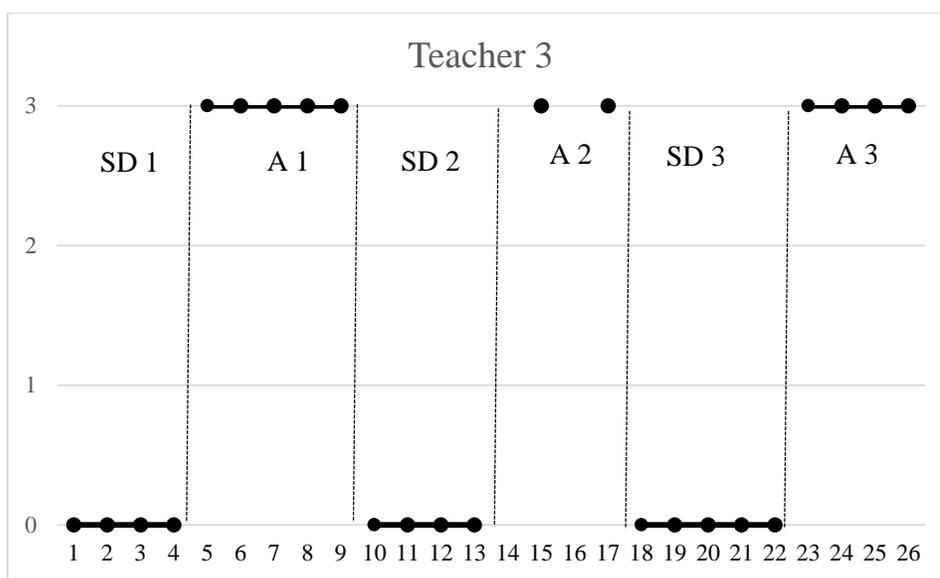


Figure 2: Each Teacher's Daily Fidelity Score in Using Aided Input to Model their Communication during the Lesson

The second aided input item on the fidelity checklist was the number of times each of the targeted words was modeled. Every week there was a list of 10 target words comprised of five core words that stayed the same throughout the study while five *fringe* words changed weekly. Teachers received scores on the fidelity checklist based on the number of times per lesson the target words were modeled. A teacher would score zero points for not modeling or *inputting* any of the target words during the lesson, 1 point if they modeled each of the words 0-1 time, 2 points if they modeled each of the words two times, and 3 points for modeling each of the words three or more times in the lesson. For example: If the teacher modeled all ten words once during a lesson, they would receive a score of 1 point. If all 10 target words were modeled three or more times, they scored 3

points; If 9 of the 10 target words were modeled three times but the 10th word was only modeled two times, the teacher only scored 2 points.

Teacher 3 modeled the target words the most, however, her score fluctuated the most with scores ranging from 1 to 3 points during the aided input weeks. Teacher 3 had one 3, three 2's, and seven 1's compared to the other two teachers who scored all 1's. Teacher 2 did not return to the third standard procedure in 3 out of the 4 days and continued modeling the target words.

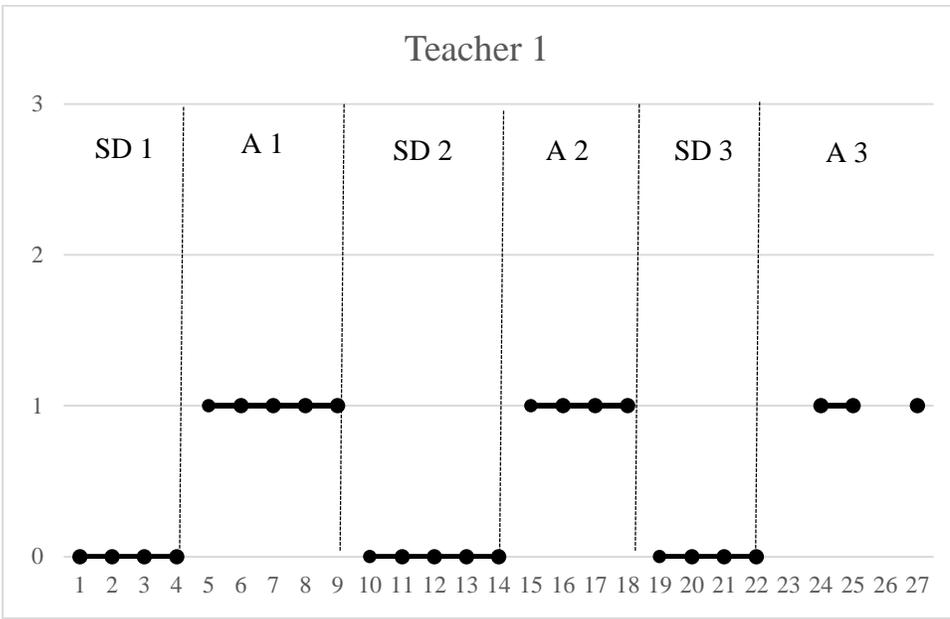


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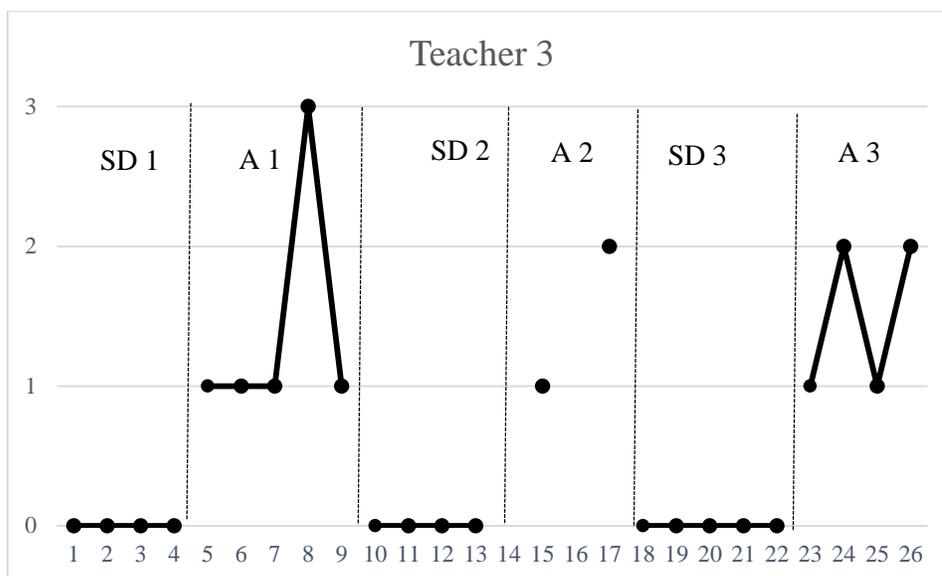
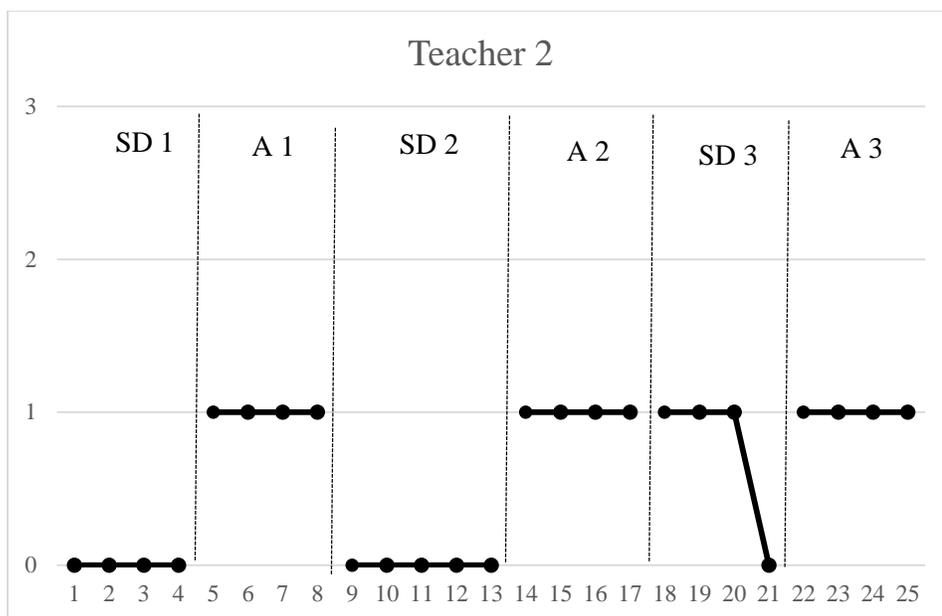


Figure 3: Each Teacher's Daily Fidelity Score in Modeling Targeted Words

All three teachers struggled to score a 2 or higher on the fidelity checklist for not modeling all of the targeted words multiple times in each lesson. Figure 4 below shows the total number of target words modeled per condition. Teachers 1 and 2 each scored only 1 point on the fidelity checklist for modeling target words, yet the total number of times they modeled any of the target words was 32-88 a week during an aided input condition. Figure 4 also illustrates Teacher 2's difficulty returning to standard procedure in the third phase by continuing to model target words. Even though Teacher 3 scored seven 1's for modeling target words, you can see below the teacher modeled the most with 160-450 target words per aided input condition. Both Teachers 1 and 3 had technical difficulty during aided input conditions (Teacher 1 during the third aided input condition and Teacher 3 during the second aided input condition), resulting in each teacher not having data for two of the days.

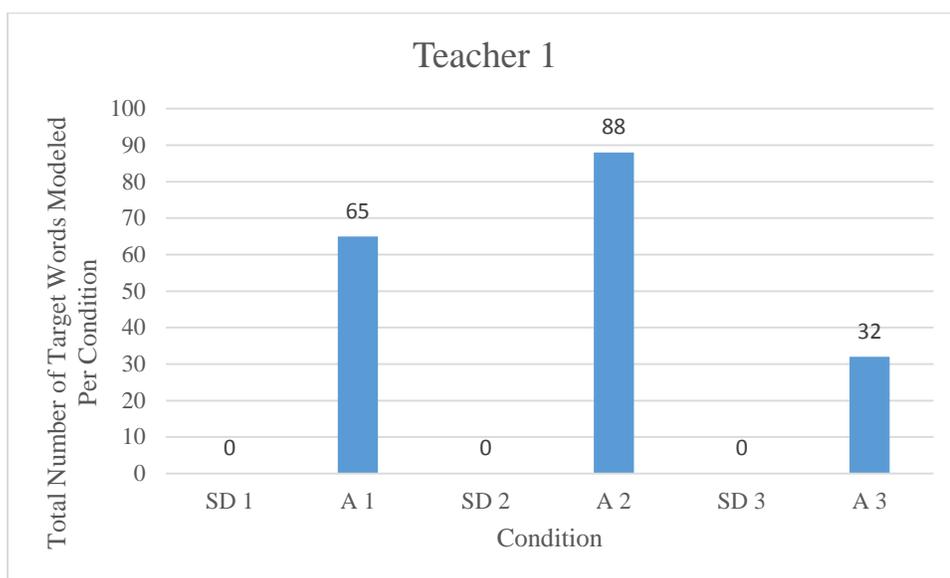


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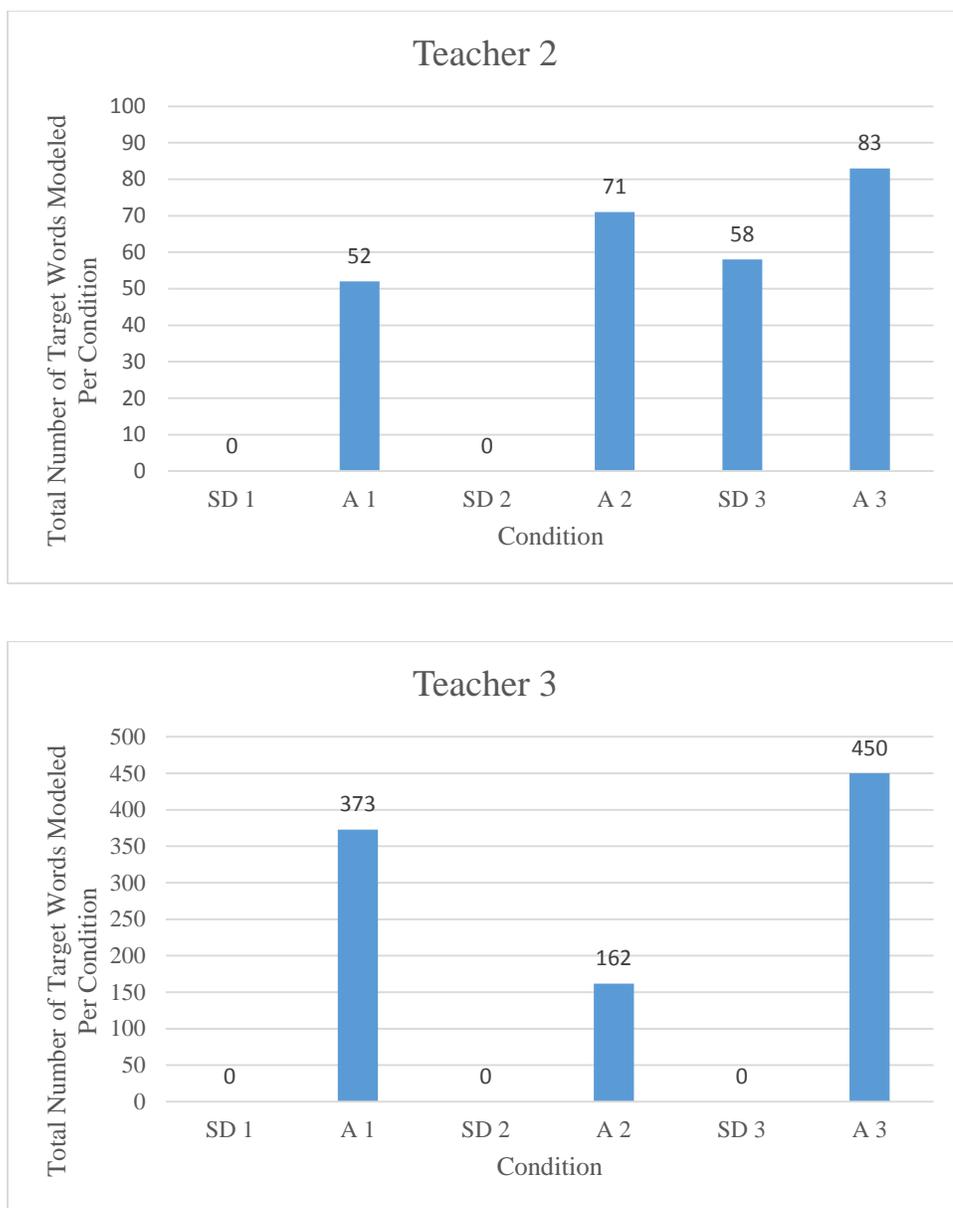


Figure 4: Total Number of Target Words Modeled Per Condition

The final aided input item addressed the different functions of language modeled in each lesson. The teacher scored 0 points if they modeled zero to one language function, 1 point for two functions, 2 points for three functions, and 3 points for four or more functions modeled in a lesson. For example: If the teacher asked the child, “Where is the shark?” while modeling “shark” then they would earn a point for modeling the language function of *asking a question*. If the teacher went on to say, “Look out! The shark is going to bite you!” while modeling “look out” and “bite” they would earn another point for modeling the function of *gaining attention* and a third point for *commenting*. Figure 5 illustrates that each teacher was able to model different language functions, and typically scored 3 points.

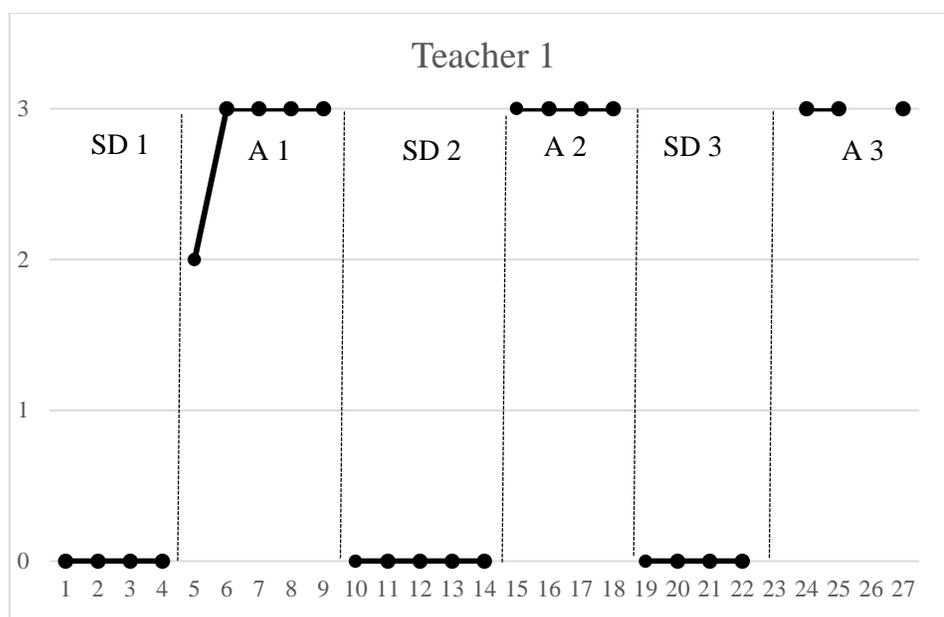


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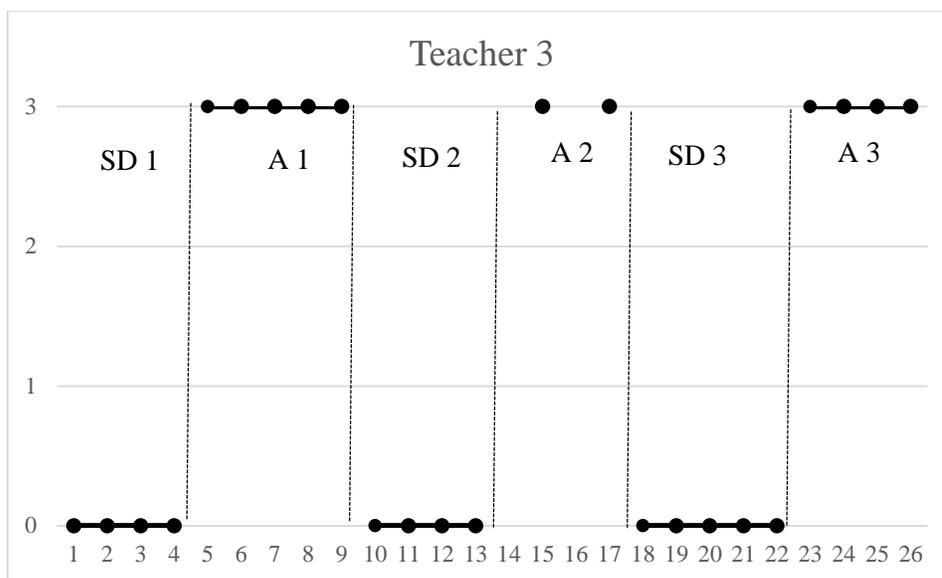
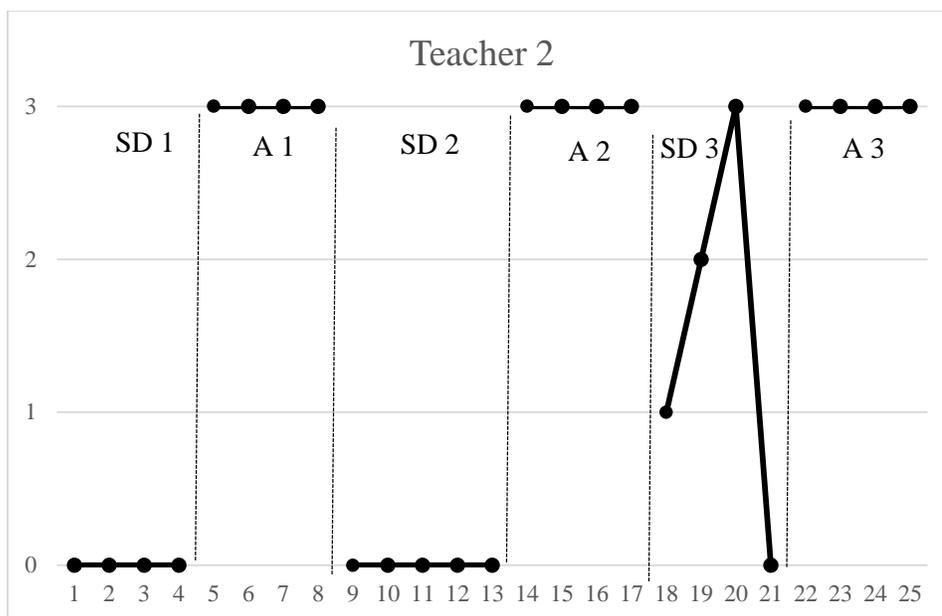


Figure 5: Each Teacher's Daily Fidelity Score in Modeling the Different Language Functions

Measure 2: Examining Student Language and Communication Acquisition

Each week, teachers focused instruction on a group of 10 target words. Five words were considered *core* words and stayed the same throughout the study. Another five words were *fringe* words and changed from week to week. Data was collected on student vocabulary acquisition through the use of pre and posttest.

Inspection of the figures reveals several results. First, each child increased in the number of words identified. Second, increases in words identified could be found during both conditions. Child 1 showed an increase in four of the six weeks and no change during the other two weeks with a range of zero to three words learned per week. Child 2 increased in words identified in four of the weeks, stayed the same in one week, and decreased in the other, their range in words learned was -2 to 5. Child 3 showed growth in five of the six weeks and the other week remained the same. Child 3 increased the most in words learned with a range of up to seven words.

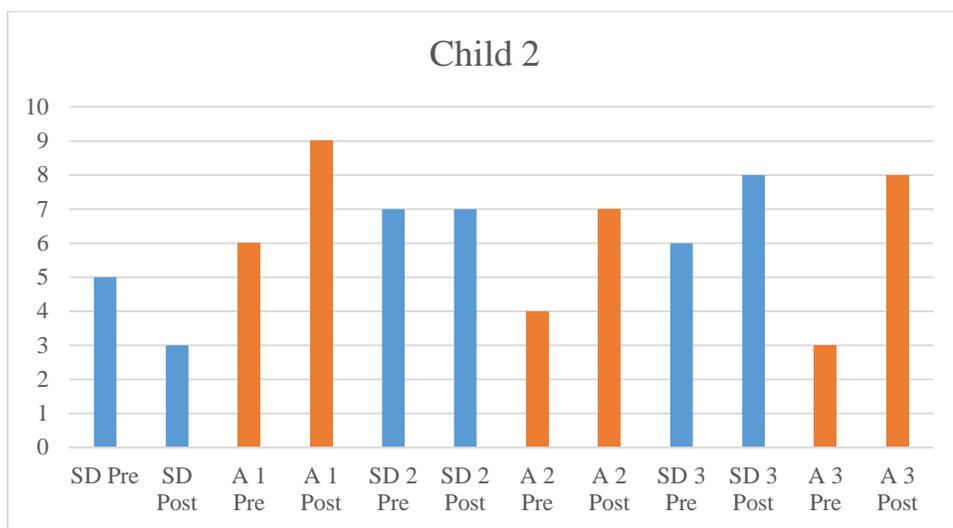
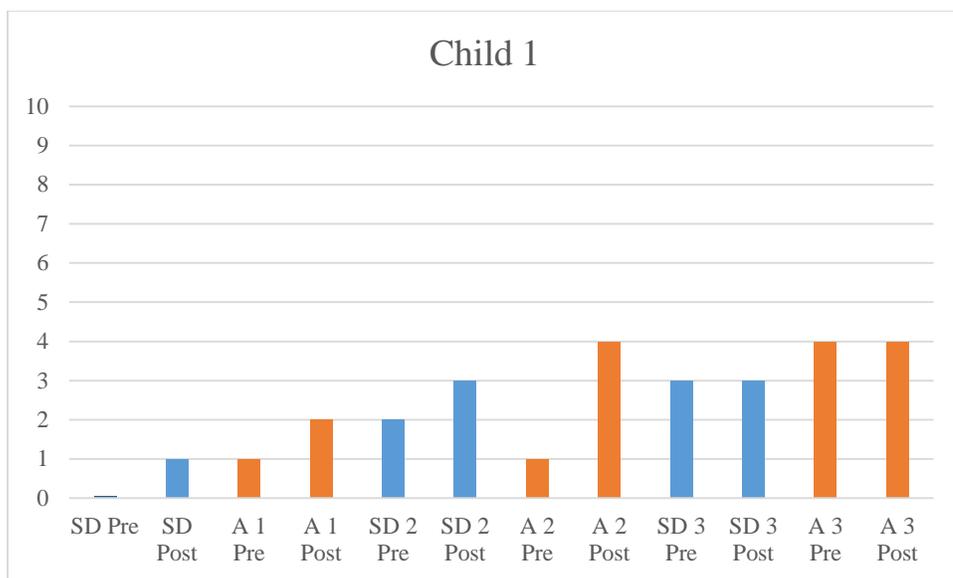


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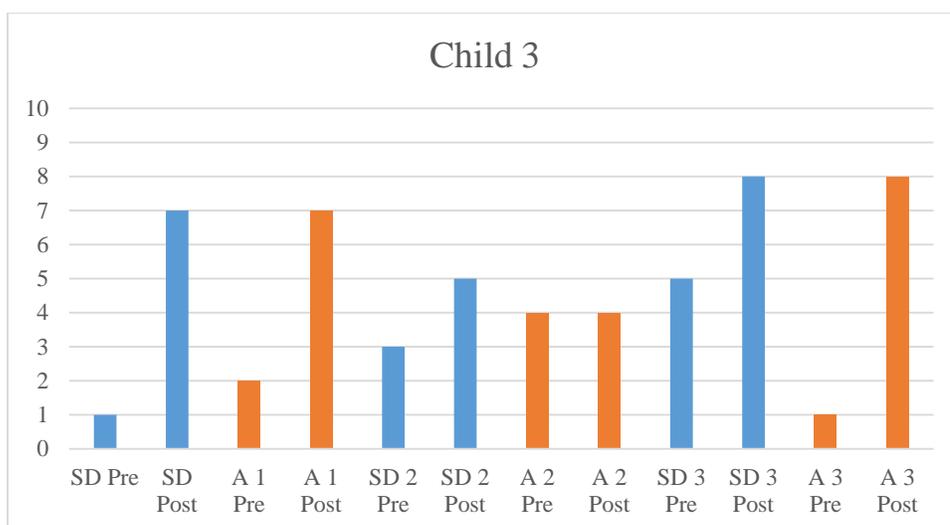


Figure 6: Each Child's Pre/Post Scores on Targeted Words for the 6 Alternating Conditions/Weeks

When comparing the mean growth between the two conditions, a trend appeared higher with aided input having more words acquired than during the standard condition. Child 3 increased words identified by 0.4, Child 1 0.63, and Child 2 the most with 3.7 during the aided input condition.

	SD 1	A 1	SD 2	A 2	SD 3	A 3
Child 1	1	1	1	3	0	0
Child 2	-2	3	0	3	2	5
Child 3	6	5	2	0	3	7

Figure 7: Weekly Growth from Pre to Posttest Per Student

	SD	A
Child 1	.67	1.3
Child 2	0	3.7
Child 3	3.6	4

Figure 8: Mean Growth Per Condition

Measure 3: Post Study Interviews

Teacher perceptions and satisfaction data was collected through a post-study interview by the researcher in person. Questions are as follows.

1. To what degree do you believe aided input is effective in teaching communication/language skills?
2. Is aided input more effective than what you were doing during baseline/typically?
3. What do you see as the benefits of aided input?
4. What do you see as the challenges of aided input?

The interviews yielded information about training and technical support given, the impact aided input had on their student's language and communication development, the benefits of aided input on their instruction, and the challenges.

Training and Technical Support Given

The teachers appreciated the initial training and feedback provided throughout the study (see Table 1). They mentioned the planning form to be a useful tool in thinking about the aided input they would provide during the lesson. It helped them conceptualize what they would “say” and where to find each of the symbols. It also helped them address the different language functions, and ensure use of each of the targeted words.

The teachers appreciated the numerical information they were given during the study. For example, Teacher 2 appreciated knowing which words she had or had not used. This information helped her plan the aided input instruction for the next day. Two of the three teachers mentioned they did not like when feedback was withdrawn in weeks 5 and 6.

All three of the teachers mentioned in the post-study interview that they wished other adults involved with their students had been trained (i.e., Speech and Language Pathologists, Para Professionals, and parents). The teachers believed in the power of aided input and felt the stretch could be much wider if more adults in the child’s life knew how to implement.

Table 1

Response to Training, Materials, Feedback and Support

<p>Teacher 1:</p> <ul style="list-style-type: none"> • Wished paras and SLP had been trained • The teacher missed the feedback in weeks 5 and 6 <p>Teacher 2:</p> <ul style="list-style-type: none"> • Wished paras had training • Liked having the feedback with the stats (you used all of the words but "that") helped draw awareness for planning - toward the end of the study would "google" sentences to use various core words • Did not like when feedback was withdrawn • Would've been nice to watch a video of someone doing aided input with two step scanning <p>Teacher 3:</p> <ul style="list-style-type: none"> • Wished paras would have had training • Liked planning sheets initially-didn't need them toward the end • Learned how to manipulate the student's device • Would have been beneficial to practice on the student's device a head of time
--

The Impact Aided Language Had on their Student's Language and CommunicationDevelopment

The teachers saw a direct impact on the child's language and communication (see Table 2). From the child being more willing to use their device to being able to independently navigate to find the symbols needed to express themselves. They saw it as a great tool for expanding vocabulary and found power in "comments" versus the typical "academic" language. The children learned to use core words in their communication where they had previously only been exposed to fringe words.

Table 2

Effectiveness of Aided Input on Language and Communication

<p>Teacher 1:</p> <ul style="list-style-type: none"> • The student began using the device when the teacher did not understand her • Likes to show off what she can do with her device • The student's becoming more comfortable with the device • The student had been using her device 3 times a week in speech for 2 years and was never using it as much as she is now <p>Teacher 2:</p> <ul style="list-style-type: none"> • Increasing the modeling helped the student learn how to use the words & different pages • Higher expectations for him: his device can have more options for lang. even if he's only using a few words • Power in "comments" and fun words • Typically requesting academic vocab. now more spontaneous communication • Great tool-especially with new vocabulary <p>Teacher 3:</p> <ul style="list-style-type: none"> • In a later week, student independently navigated to a previously taught page to indicate her thoughts • Was able to add and teach new vocabulary weekly • Helpful to have core words on each page • Hearing the words helped with receptive and expressive language
--

The Benefits of Aided Input in their Instruction

The teachers found aided input benefited their instruction (see Table 3), and did not like when they had to return to the standard procedure. Aided input became a natural part of their communication with the student during instruction. All three teachers believed a benefit of aided input was modeling on the student's device. Modeling made the teacher more empathetic to what the child had to go through to express their ideas, it helped them understand the amount of words needed to be programmed on the device so they could express different ideas, and demonstrated navigation for the student, who then became more willing to use their device.

Table 3

Benefits of Aided Input

<p>Teacher 1:</p> <ul style="list-style-type: none"> • Aided input seems to be better than the typical skill practice the SLP does with the device the student is using the device more often to communicate • Seeing the teacher model using her device made her more comfortable with it and being able to navigate to words • Providing modeling and give her strategies for finding items • Increased navigation and using the communication device <p>Teacher 2:</p> <ul style="list-style-type: none"> • I used to touch the student's screen, now I use the device like he does to model (two-step scanning) • Made me aware of the frustration the student must feel when trying to communicate: Empathy-slow down thoughts • Amount of words the student needs access to • Paras observe potential in student's communication and that it doesn't need to go to mastery to introduce new vocabulary <p>Teacher 3:</p> <ul style="list-style-type: none"> • Noticed peers wanting to use device • Helped student learn where the buttons were and how to find • Modeling use of iPad so student can see it is a helpful tool • Became natural- hard to not do aided input in the "off" weeks • Not time consuming- natural part of conversation
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The Challenges

Even though aided input became a natural part of the teacher's instruction it did not come without some challenges (see Table 4). Preparing for adding new vocabulary and figuring out how to organize vocabulary was mentioned as a struggle by two of the teachers. Teacher 1 mentioned that it was a challenge because it was for only a small portion of the day; and as indicated in the "training," wished others had been trained so it could be used throughout the day. Teacher 3 found it difficult at times to "know what to say" to address all 10 of the targeted words in a single lesson. As indicated in the

“training” section, the teacher found it helpful to have a “cheat sheet” to deal with the challenge.

Table 4

Challenges of Aided Input

Teacher 1:

- Limited part of the day (only 30 min/day)
- Planning for continuance for next year

Teacher 2:

- Time consuming with two step scanning
- Coming up with new vocabulary weekly
- Figuring out how to organize vocabulary

Teacher 3:

- Having vocabulary prepared
- Knowing what to say "cheat sheet"

CHAPTER V

DISCUSSION

Summary of Findings

This study was designed to examine an intervention strategy, aided input, for teaching children language and communication skills when using AAC and what it takes to foster quality implementation by teachers. The summary is as follows. First, teachers can learn to implement aided input with high quality and fidelity quickly and easily through coaching and support. Second, once teachers learn to use aided input in their instruction they can continue to implement without the support of a coach. Third, aided input can be used as an intervention to assist in teaching language and communication skills. Each of the findings will be discussed in further detail.

Can teachers learn to implement aided input in a high-quality/fidelity way with coaching and support?

Three teachers learned quickly how to implement aided input and use within their daily instruction with relatively little coaching and support. Several factors fed into answering this question; the amount of training needed, the development and use of a fidelity checklist, and a possible reason for stronger implementation.

First, the amount of training needed to implement aided input with high quality was relatively brief. The teachers received training from the researcher who created a PowerPoint presentation to instruct the teachers on what aided input was and how it could

be implemented into daily instruction. With guidance, the teachers were able to add new vocabulary to their student's AAC device and plan activities to teach the new words. Teachers were also able to use an Aided Input Planning Sheet (see Appendix B) to help with addressing different language functions (i.e. initiating, requesting, commenting, etc.) and script what they were going to say and model. Through remote feedback, the teachers were able make small changes to have a higher success rate with implementation.

In order to give feedback and determine if aided input was being implemented with high quality and fidelity, the researcher created a fidelity checklist. The fidelity checklist was sensitive in showing the amount of aided input done in a lesson and the different language functions used. The researcher could provide tips to increase modeling and use of target words. This feedback helped teachers learn to implement with higher quality. However, the fidelity checklist may not be sensitive enough when looking at the number of times a target word was used. Teachers could score 2 points if they used every target word two or more times in a lesson. It proved difficult for the teachers to use every word multiple times in a single lesson, therefore they could not score higher on the checklist. Teacher 2 even developed her own way of tracking which words she had used during a lesson to make sure she used each of them at least once.

With training and feedback impacting implementation, the use of aided input varied between the three teachers. Teacher 3 had the most success with implementing aided input. Perhaps because aided input was similar to what she already did during her typical instruction (standard procedure). During standard procedure she would tell the

student what to “say” by pointing to the symbols on the device and instructing the student to press the words. The difference between her typical instruction and aided input was that aided input focuses on the teacher modeling their thoughts not the teacher instructing the student what to say. In her typical instruction, this teacher was already used to pointing to the symbols because she would encourage the student to speak often. One could speculate it would not be as difficult for this teacher to make the leap to using symbols for her own communication because she was used to helping the child use it for theirs.

Another reason a teacher may score higher on the fidelity checklist than another could be the study design. The study was designed for 10-15 minute lessons. If a teacher did not get through their instruction in this timeframe they may have missed out on some of the points possible. Teacher 1 may have fewer points according to this study because her lessons were typically 30 minutes long. Because Teacher 1’s lessons were longer, sometimes the aided input instruction was not observed, in turn causing lower scores on the fidelity checklist. For example, the teacher may have spent 10 minutes using aided input to chat with the student about their visit to the dentist office yesterday, not instructing on the target words, before getting into the lesson. The teacher would score 2 points for using aided input up to 50% of the 10 minute conversation and only 1 point for using target words.

The fidelity checklist was essential to this study. The checklist had its shortcomings with scoring at times and could be improved in sensitivity. However, it

could be a tool teachers, administrators, coaches, and SLP's utilize to set goals, self-monitor, and provide insight into instruction.

When support is faded, can teachers continue to implement aided input with high quality?

This study demonstrated aided input could be continued with high quality and fidelity without coaching and support for one additional phase. Through the initial two phases with coaching, aided input became a natural part of teacher instruction. Teachers noted they did not need to continue using the planning sheets as they became more comfortable with implementing. Teacher 2 even struggled to stop using aided input during the third standard procedure phase because it had become second nature to her. Coaching was key to the initial successful implementation and may not be needed over an extended period of time, however, it is unclear how implementation would continue without support over time.

Is aided input intervention effective in teaching language and communication skills?

The results of the post-study interview and pre and posttests suggest aided input helps teach language and communication skills. Teachers cite direct modeling as having a major impact on their student's language and communication skills. However the extent to which language and communication skills were impacted is uncertain at this time.

Direct modeling impacted teacher instruction and student language acquisition in many ways; building a robust vocabulary, utilizing core words, and navigating. First, teachers needed to rethink their student's AAC vocabulary. For a teacher to directly model their thoughts using the student's device, they would need a robust vocabulary system at their fingertips. The teacher needs to program more vocabulary and/or explore where the vocabulary was already on the system. Another aspect tied to direct modeling was the use of core words. Typically, teachers expose students to fringe words because they are the easiest (concrete) for the child to understand. This study wanted to explore core words to see if children could learn them as well. This helped shift the teacher's focus and expand the language possibilities for the students. Finally, through direct modeling the students were shown how to navigate their devices to find the symbols they needed to express their ideas.

Teacher 2 found through aided input that the student did not have enough vocabulary programmed on his device nor was it set up to navigate easily to enable him to say what he wanted, when he wanted. Prior to aided input, she would set specific fringe vocabulary on the child's device related to that week's story. The following week she would reprogram and delete the words from the previous week. She also realized that when she had programmed vocabulary on his device in the past it was all academic fringe words (i.e. electricity and energy). Through implementing aided input, she began to think of other language functions (i.e. commenting and initiating), and started programming comments and questions. She saw it as a great tool for expanding vocabulary and found power in "comments" verses the typical "academic" language.

Teacher 1 recognized her student was more willing to use her device and was able to independently navigate to find the symbols needed to express herself. Over the course of the study, Student 1 learned all five of the core words and only one of the 30 fringe words. This may be because the same five core words were tested throughout the study while the five fringe words tested changed weekly. This student was able to learn core words which in the past may have been thought too difficult to comprehend.

The extent to which language was impacted by aided input is yet to be uncovered. Pre and posttests were designed as a quick and easy way for teachers to measure vocabulary acquisition. The test revealed some positive initial results; students learned vocabulary words over the course of the study. However the pre and posttests do not clearly show whether aided input was superior to the standard procedure. This could be due to a possible cumulative effect in learning as the weeks progressed. It was difficult to know if the child had learned the word during that condition or during the previous condition because the core words were carried throughout the length of the study. Pre and posttests also did not show the extent to which language and communication skills were developed, such as, initiating, responding, expanding utterances, and more. Further testing, analysis of transcripts, or observations could explore the extent of aided inputs impact on language and communication skills.

Limitations

There were some limitations in this study despite the positive results. First, a small sample size means the results cannot be generalized. With only three participating

teachers and three participating students, it is difficult to know if the intervention would have a similar impact elsewhere. Second, the study design, six weeks with AB reversal and 10 to 15 minutes of instruction a day, made for a short timeframe. Another limitation of the AB reversal design, could be the difficulty to make connections in the pre and posttest because of a possible cumulative effect from week to week.

Recommendations for Future Research

This study extends the literature base for children with significant communication disabilities and interventions to be implemented with AAC. Future studies need to focus on addressing the limitations of this study. There are many factors that can affect the success of aided input intervention and need more research to learn best practices for implementation. Many questions still exist around implementing aided input. For instance,

- How can the fidelity checklist be improved in regard to the use of target words?
- Can teachers continue to implement aided input with high quality and fidelity for extended periods?
- What is the optimal amount of exposure using aided input to have the biggest impact on language acquisition?
- Are there other ways for teachers to assess the impact of aided language on student language acquisition?

Conclusions

Teachers were able to implement an intervention in their classroom to foster language and communication for children who use AAC. This study demonstrated that the intervention was quick for teachers to learn and children were able to benefit from this type of instruction.

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APPENDIX A

FIDELITY CHECKLIST

Week ____ Day ____ Teacher 1 2 3 Lesson/Activity _____	Score: /25			
	NA/0	1	2	3
1. Instruction is delivered in accordance w/ the respective week	No-Teacher used aided input and it is not a regular part of their baseline instruction No-Teacher did not use aided input	Yes-Teacher returned to baseline Yes-Teacher implemented aided input	NA	NA
2. Lesson & Materials prepared & ready for instruction	There appear to be no goals or objectives present	It appears the goals and objectives for the lesson/activity are not clear	It appears the teacher has established goals and objectives for the lesson/activity	It appears the teacher has established goals and objectives for the lesson/activity and it is engaging with relevant materials
3. AAC system is present	AAC system is not near the instructional area	During the lesson/activity the student or teacher brings the AAC system to the instructional area	AAC system is in close proximity to the student and teacher	AAC system is in close proximity to the student and teacher with ability to jointly view the screen/face
4. Fringe words are relevant to activity	None of the fringe words chosen for this week match the lesson/activities (0/5)	Few of the words chosen for this week match the lesson/activities (1-2/5)	Some of the words chosen for this week match the lesson/activities (3-4/5)	All of the words chosen for this week match the lesson/activities (5/5)
5. Teacher actions	Teacher does not <ul style="list-style-type: none"> • Acknowledge communication attempts • Reiterate-child's communication • Expand-or clarifies child's communication 	Teacher does 1/3 <ul style="list-style-type: none"> • Acknowledges communication attempts • Reiterates child's communication • Expands or clarifies child's communication 	Teacher does 2/3 <ul style="list-style-type: none"> • Acknowledges communication attempts • Reiterates child's communication • Expands or clarifies child's communication 	Teacher does all 3 <ul style="list-style-type: none"> • Acknowledges communication attempts • Reiterates child's communication • Expands or clarifies child's communication
6. Teacher allows opportunities for the child to	Instruction is teacher centered with little to no	Instructor asks the child a couple of questions and may	Infrequently the instructor allows for wait time	Frequently throughout the lesson the

communicate during the lesson	opportunity for the child to communicate using their AAC system	pause for a response	throughout the lesson/activity, asks questions and provides engaging interactions (saying uh-oh and expectantly looks at the student to imitate)	instructor allows for wait time throughout the lesson/activity, asks questions and provides engaging interactions (ex. saying uh-oh and expectantly looks at the student to imitate)
7. Teacher uses aided input to model their communication	There was no aided input used (0%)	There was Minimal amount of aided input used (1-25%)	The teacher used some aided input (26% - 50%)	Aided input was implemented throughout the lesson/activity (51% - 100%)
8. Teacher uses aided input w/ Core & Fringe (does not count prompting child to use symbols)	Teacher uses words but does not highlight symbols (it's baseline week)	Teacher uses and models each of the words 0-1 time in the lesson	Teacher uses and models each of the words 2 times each in the lesson	Teacher uses and models each of the words 3 or more times each times in the lesson
9. Language modeled through aided input had different functions (does not count teacher verbally modeling functions)	Teacher models 0-1 function <ul style="list-style-type: none"> • Gain Attention • Comment • Request • Reject • Asking Question • Initiate 	Teacher models 2 functions <ul style="list-style-type: none"> • Gain Attention • Comment • Request • Reject • Asking Question • Initiate 	Teacher models 3 functions <ul style="list-style-type: none"> • Gain Attention • Comment • Request • Reject • Asking Question • Initiate 	Teacher models 4+ functions <ul style="list-style-type: none"> • Gain Attention • Comment • Request • Reject • Asking Question • Initiate

APPENDIX B
AIDED INPUT PLANNING SHEETS

Teacher: _____ Lesson: _____ Week: _____

Key Words: no (not/don't), it, that, what, on

Language Function:	Do (action/gesture):	Say This:	Model This (touch these symbols/words on AAC system):	1 or 2 word	3-4+ words
Gain Attention Comment Request Reject Ask Question Initiate					

Adapted from

http://www.fcps.edu/dss/conference/materials/Session_3/34_Kalamajka_VocabAAC/LanguaugeDevelopment.pdf

Retrieved April 4, 2015.

APPENDIX C
UNIVERSITY OF NORTHERN IOWA
HUMAN PARTICIPANTS REVIEW
INFORMED CONSENT

Teacher

Project Title: Examining Aided Input Intervention in a Classroom Setting

Name of Investigator(s): Jennifer Flores

Invitation to Participate: You are invited to participate in a research project conducted through the University of Northern Iowa. The University requires that you give your signed agreement to participate in this project. The following information is provided to help you make an informed decision about whether or not to participate.

Nature and Purpose: This research is important because communication is a powerful part of a person's life. Unfortunately, approximately 4 million Americans cannot meet the communication needs of their daily lives through natural speech (Beukelman & Mirenda, 2013). When this occurs they may face severe restrictions in their lives.

Augmentative and Alternative Communication AAC is meant to support communication for those who struggle with natural speech.

The purpose of this research is to examine aided input as an intervention strategy for teaching children language skills and communication through AAC and what it takes to foster quality implementation by teachers.

Explanation of Procedures: This study will take place within classrooms in the Dubuque Community School District. The participants will be the teacher in these classrooms as well as the targeted student(s) in the classrooms. The study design will use ABABAB reversal, over a 6 -8 week period, to examine 2 conditions. The first condition, baseline, includes the teacher implementing their existing practices when teaching a child who uses AAC. The second condition, intervention, will include the teacher implementing aided input strategies when teaching a child who uses AAC. Aided input is achieved through a communicative partner pointing to or highlighting corresponding symbols on the child's AAC system as they speak. (The teachers will be taught by the

researcher how to implement the aided input intervention through professional development sessions outside contract time.)

Each teaching session will last approximately 10-15 minutes daily. (At this time, not able to give specific instructional skills until the student is identified and communication goals examined.)

The teacher will videotape daily sessions and the research team will transcribe each session looking for the fidelity and implementation of the aided input intervention. The researcher will also use these observations to gain daily language samples. The teacher will collect weekly pre/post assessments of the targeted language skills. The researcher will analyze and interpret the data to see what impact the intervention condition is having.

A maintenance phase will be included. This phase will be used to determine if the use of strategies will continue once the coaching support has been withdrawn. The same data and will be collected during the maintenance phase. The only difference will be that the teachers will not receive coaching during this phase.

A post study interview of teacher perceptions of aided language strategies will be conducted.

Discomfort and Risks: No anticipated risks are associated with this study. It is possible teachers may not like or find the intervention practices difficult to implement causing them to have some discomfort in participating. If this occurs, participants will be reminded they may withdraw from the study. Participants may also be uncomfortable being videotaped and can either withdraw or the researcher will find another way to collect the data.

Benefits and Compensation Participants will learn to implement a practice that is immersing as an effective strategy in supporting language and communication for students who use AAC. Teachers will receive coaching and support in implementing the new practice into their daily instruction. They may find the intervention strategy to be a useful tool in teaching children how to effectively communicate using their AAC systems. They will be able to compare the intervention practice with the original practice and determine if the one practice is better than the other, and anticipate aided language will have better results. Teachers may want to continue to use the intervention past the research study timeframe. Compensation in any form other than learning outcomes will not be a part of this research.

Confidentiality: Information obtained during this study which could identify you will be kept confidential.

During this research study it is necessary to have videotaped sessions to collect data and record information. Transcripts will be coded along with data collection sheets. Teacher interviews will be conducted at the conclusion of the study to gain information about teacher perception of the intervention practices. The teacher interviews will be

videotaped as well. Teachers will be coded as Teacher 1 and Teacher 2 and even though they won't have any identifiers (no names, ages, genders, etc. will be shared) the persons will be visible on tape. The research team will be the only ones to see the videotapes and data, which will be kept in a locked file cabinet for a year and then destroyed.

The summarized findings with no identifying information may be published or used during a presentation.

Right to Refuse or Withdraw: Your participation is completely voluntary. You are free to withdraw from participation at any time or to choose not to participate at all, and by doing so, you will not be penalized or lose benefits to which you are otherwise entitled.

Questions: If you have questions about the study or desire information in the future regarding your participation or the study generally, you can contact Jennifer Flores at 563-542-7344 or (if appropriate) the project investigator's faculty advisor Frank Kohler at the Department of Special Education, University of Northern Iowa 319-273-7484. You can also contact the office of the IRB Administrator, University of Northern Iowa, at 319-273-6148, for answers to questions about rights of research participants and the participant review process.

Agreement:

I am fully aware of the nature and extent of my participation in this project as stated above and the possible risks arising from it. I hereby agree to participate in this project. I acknowledge that I have received a copy of this consent statement. I am 18 years of age or older.

(Signature of participant) (Date)

(Printed name of participant)

(Signature of investigator) (Date)

(Signature of instructor/advisor) (Date)

APPENDIX D
UNIVERSITY OF NORTHERN IOWA
HUMAN PARTICIPANTS REVIEW
INFORMED CONSENT

Parent

Project Title: Examining Aided Input Intervention in a Classroom Setting

Name of Investigator(s): Jennifer Flores

Invitation to Participate: Your child is invited to participate in a research project conducted through the University of Northern Iowa. The University requires that you give your signed agreement to participate in this project. The following information is provided to help you make an informed decision about whether or not to participate.

Nature and Purpose: This research is important because communication is a powerful part of a person's life. Unfortunately, approximately 4 million Americans cannot meet the communication needs of their daily lives through natural speech (Beukelman & Mirenda, 2013). When this occurs they may face severe restrictions in their lives.

Augmentative and Alternative Communication AAC is meant to support communication for those who struggle with natural speech.

The purpose of this research is to examine aided input as an intervention strategy for teaching children language skills and communication through AAC and what it takes to foster quality implementation by teachers.

Explanation of Procedures: This study will take place within your child's classroom during daily instructional activities. Your child's classroom teacher will be taught how to implement aided input strategies within their typical instructional activities.

Aided input is achieved through a communicative partner pointing to or highlighting corresponding symbols on the child's AAC system as they speak.

Each teaching session will last approximately 10-15 minutes daily and will be videotaped for data collection purposes.

Discomfort and Risks: No anticipated risk are associated with this study. Participants may be uncomfortable being videotaped and can either withdraw or the researcher will find another way to collect the data.

Benefits and Compensation: For student participants, they may receive intervention that is beyond their typical instruction and may progress in language and communication achievement at a faster pace. Compensation in any form other than learning outcomes will not be a part of this research.

Confidentiality: Information obtained during this study which could identify the student will be kept confidential. The summarized findings with no identifying information may be published or used during a presentation.

During this research study it is necessary to have videotaped sessions to collect data and record information. Transcripts will be coded along with data collection sheets. Students will be coded as Student 1 and Student 2 and even though they won't have any identifiers (no names, ages, genders, etc. will be shared) the persons will be visible on tape. The research team will be the only ones to see the videotapes and data, which will be kept in a locked file cabinet for a year and then destroyed.

Right to Refuse or Withdraw: Your participation is completely voluntary. You are free to withdraw from participation at any time or to choose not to participate at all, and by doing so, you will not be penalized or lose benefits to which you are otherwise entitled.

Questions: If you have questions about the study or desire information in the future regarding your participation or the study generally, you can contact Jennifer Flores at 563-542-7344 or (if appropriate) the project investigator's faculty advisor Frank Kohler at the Department of Special Education, University of Northern Iowa 319-273-7484. You can also contact the office of the IRB Administrator, University of Northern Iowa, at 319-273-6148, for answers to questions about rights of research participants and the participant review process.

Agreement:

I am fully aware of the nature and extent of my child's participation in this project as stated above and the possible risks arising from it. I hereby agree

for my child to participate in this project. I acknowledge that I have received a copy of this consent statement. I am 18 years of age or older.

(Signature of participant) (Date)

(Printed name of participant)

(Signature of investigator) (Date)

(Signature of instructor/advisor) (Date)

APPENDIX E
UNIVERSITY OF NORTHERN IOWA
HUMAN PARTICIPANTS REVIEW
INFORMED ASSENT

For Young Child Approximately 3-6 Years Old

Project Title: **Examining Aided Input Intervention in a Classroom Setting**

Name of Principal Investigator(s): Jennifer Flores

I, _____, have been told that my mom, dad, or the person who takes care of me has said that it is okay for me to take part in an activity about talking.

I am doing this because I want to. I have been told that I can stop my part in the activity at any time. If I ask to stop or decide that I don't want to do this activity at all, nothing bad will happen to me.

Name

Date

APPENDIX F
UNIVERSITY OF NORTHERN IOWA
HUMAN PARTICIPANTS REVIEW
INFORMED ASSENT

For Young Child Approximately 7-12 Years Old

Project Title: **Examining Aided Input Intervention in a Classroom Setting**

Name of Principal Investigator(s): Jennifer Flores

I, _____, have been told that my mom, dad, or the person who takes care of me has said that it is okay for me to take part in an activity about language and communication. My teacher will learn to use my communication device during classroom activities to model language and communication. I can use my device at any time and my teacher will not expect me to use your device any differently than usual.

I am doing this because I want to. I have been told that I can stop my part in the activity at any time. If I ask to stop or decide that I don't want to do this activity at all, nothing bad will happen to me.

Name

Date

APPENDIX G
LETTER OF COOPERATION

The Dubuque Community Schools-_____ is pleased to collaborate with Jennifer Flores on the project Examining Aided Input Intervention in a Classroom Setting.

We understand that participating in this research will include a six week study of an AAC intervention in our special education classroom. We had ample opportunities to discuss the research with Jennifer Flores and to ask for clarifications. Furthermore, Jennifer Flores and key personnel for this project will maintain confidentiality of all research participants in all phases of this project. According to our agreement, project activities will be carried out as described in the research plan reviewed and approved by the University of Northern Iowa Institutional Review Board.

We look forward to participating in this project, and please consider this communication as our Letter of Cooperation.

Sincerely,

[Name]
Elementary School Principal