Abstract

Sarah Frueh. Social Communication between Intellectually Disabled, Severe Middle School Students who use Augmentative and Alternative Communication and their Typically Developing Peers. (Under the direction of Dr. Kathleen Cox, Ph.D.) Department of Communication Sciences and Disorders, May 2013.

Augmentative and Alternative Communication (AAC) devices are often used as a mode of communication for people who cannot use spoken language to meet all of their communication needs. Current research is limited regarding social communication among Intellectually Disabled, Severe (IDS) students who communicate with AAC and their typically developing peers. The purpose of this study was to determine whether social communication occurs among middle school students enrolled in an IDS classroom and typically developing peers, and whether a treatment program improved social interaction. Five middle school students participated in this study; two IDS students who use AAC and three typically developing peers. Each peer participated in a training program regarding idiosyncratic gestures and appropriate interaction with AAC users. Each Intellectually Disabled, Severe student received added social vocabulary/messages on their individual AAC devices and training in their use. Results revealed that peer training along with available social vocabulary/messages increased social communication among peers in a middle school IDS classroom.

Social Communication among Intellectually Disabled, Severe Middle School Students Who Use Augmentative and Alternative Communication and Their Typically Developing Peers

A Thesis

Presented to

The Faculty of the Department of Communication Sciences and Disorders

East Carolina University

In Partial Fulfillment

Of the Requirements for the Degree

Master of Science in Communication Sciences and Disorders

By

Sarah Frueh

May, 2013

SOCIAL COMMUNICATION BETWEEN INTELLECTUALLY DISABLED, SEVERE MIDDLE SCHOOL STUDENTS WHO USE AUGMENTATIVE AND ALTERNATIVE COMMUNICATION AND THEIR TYPICALLY DEVELOPING PEERS

by

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Dedication

This work is dedicated to my family; without your support through the long hours of research and writing, this project would not have been possible. Thank you for passing on a love and respect for education.

Love,

Sarah

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Review of the Literature

Augmentative and Alternative Communication Devices

As technology advances, Augmentative and Alternative Communication (AAC) devices become more common as a mode of communication for people who cannot use spoken language to meet all of their communication needs. AAC includes low and high-technology devices that support communication for people who are nonverbal or minimally verbal. These individuals may need AAC technology assistance due to physical limitations, such as cerebral palsy, or due to cognitive limitations that make learning language difficult. Low technology devices may or may not have voice output and if present, output is typically comprised of digitized speech recordings. High technology devices have voice output, typically synthesized or a combination of digitized and synthesized speech. AAC device displays fall within two categories: static (i.e., fixed) or dynamic (i.e., changing). Static displays feature a limited number of symbols and/or messages that do not link to one another. Dynamic displays feature electronically produced symbols and/or messages that when activated automatically change to a new set of programmed symbols (Beukelman & Mirenda, 2013). Dynamic displays usually begin at a "home" page that subsequently links to different topics of conversation and are useful in extensive conversational interactions because they allow greater numbers and variety of vocabulary.

AAC Devices & Complex Communication Needs

About 15.4 percent of people who communicate with AAC are between the ages of eleven and seventeen, which is the typical age range of middle school and high school students in the USA (Bloomberg & Johnson, 1990). Because students in *Intellectually Disabled, Severe* (IDS) classrooms vary in their cognitive and interactional capabilities, they also vary in the devices that they access for communication in and outside of the classroom. In the classroom, AAC devices may be used during group lessons and individual work for language learning and

literacy development (e.g. book adaptations, writing narratives). Still, competent communicators demonstrate the ability to request needs and wants, relay information, develop social closeness, and use social etiquette (Light, 1988).

Often, AAC devices are programmed to facilitate functional requests and fail to include messages regarding social interactions such as greetings and conversational continuers (Light, Parsons, & Drager, 2002). These social interactions promote personal relationships with others and therefore promote social closeness. In fact, Guralnick (2001) noted that "peer-related social competence is clearly aligned with issues of personal independence and...personal choice. The ability to achieve successfully and appropriately interpersonal goals involving one's peers is empowering in perhaps the most meaningful sense of the term" (p. 496). Because of the desired development or maintenance of personal relationships, the content of the messages themselves is not as crucial to the exchange as is the demonstration of interest in the interaction, duration, and frequency of occurrence (Beukelman & Mirenda, 2013). For example, while watching a school basketball game, the linguistic content and structure of comments that demonstrate joint attention and joint support of the team may not matter as much socially as the interaction frequency and discussion of the team in general.

Social Closeness

Social closeness involves a relationship between people in which social communication is used and personal conveyance of emotion is exchanged. "The goal of this type of interaction is establishing, maintaining, or developing social engagement" (Beukelman & Mirenda, 2013, p. 10). Social closeness is achieved through interactions that convey emotions, or social interactions (Beukelman & Mirenda, 2013). According to Light, Parsons, and Drager (2002), social communication as a function of social closeness must include "sustain[ed] interaction through

active engagement or involvement of both participants" (p. 190). Social communication involves interaction among people, and may include speech, tone, stress, gesturing, facial expression, and body language. Social communication may be intentional or unintentional, thus a focus on developing intentional use of gestures and phrases to initiate and sustain social interaction may facilitate social closeness (Light & Binger, 1998). While not serving the purpose of obtaining needs or wants, such messages instead help people get to know each other on a personal level and encourage social closeness. Ensuring stimulation and reinforcement in social communication activities is a key component to teaching social interaction in groups involving persons with cognitive impairments (Trottier, Kamp, & Mirenda, 2011). As a result, the best places to practice social interactions are environments where opportunities for social communication arise naturally, like a classroom or during recess (Beukelman & Mirenda, 2013).

Social relationships are an important part of social and emotional development as well as functional participation in society (Light, Parsons, Drager, 2002). Social interactions help individuals to define their own personalities. An individual's sense of his or her own personality derives from both perception of self, and others' perceptions of that person. Therefore social communication develops others' perceptions and transitively develops an individual's identity (Wickenden, 2009).

Types of Social Communication

There are many types of social communication, including conversation maintenance, non-obligatory comments, social routines, and gestures or expressions that convey attitude. Nonverbal social communication involves demonstration of interest in the interaction (e.g. gesturing, facial expression, nodding or shaking the head, proximity to the conversation partner, eye contact, a pat on the back, smiling). Verbal social communication includes conversational

continuers such as “uh-huh,” “yeah,” “I know,” jokes, conveyance of emotion, sharing of personal information, personalized questions, and other forms of conversation that involve getting to know an individual on a personal level. Small talk is a primary method of establishing social closeness and connecting ideas in a conversation. Small talk takes place after a greeting, and may comprise the bulk of a conversation or lead into later information sharing (Beukelman & Mirenda, 2013). Generic small talk is used between acquaintances, and includes vague personal questions (e.g. “how was your weekend?”) (Ball, Marvin, Beukelman, Lasker, & Rupp, 1999). Generic small talk does not require prior knowledge of the communication partner, nor is it made up of critical or important content. This type of small talk serves as a construct for socially polite interactions with various communication partners and for this reason may be used often by individuals who use AAC devices (Ball, et al., 1999). Specific small talk includes personalized questions that require previous knowledge of the communication partner (e.g. “how was the trip that you took with your mother?”) (Beukelman & Mirenda, 2013).

Gesture Types in Social Communication.

Gestures are an acceptable form of communicative small talk and social interaction because they convey emotions, attitudes, and desires. Involuntary gestures convey emotions such as surprise, interest and disinterest, emotions, and preferences. Voluntary gestures may be as complex as a form of language (e.g., American Sign Language), or simply convey a few different attitudes of the user. As a function of communication, gesture types may be classified into emblems, illustrators, affect displays, regulators, and adaptors (Ekman & Friesen, 1969). Emblems do not accompany speech, and can be formed with the hands or with the entire body. Emblems relay a specific message, like a handshake or a smile. Gestural affect displays convey emotions and may be involuntary or voluntary. The communicator may even be unaware they he

or she is depicting emotions with these gestures (Ekman & Friesen, 1969). These two types of gestures are often used by individuals with severe-profound cognitive impairments who are nonverbal (Beukelman & Mirenda, 2013). Gestural meaning may be widely accepted within a culture (e.g. head nod) or specific to the individual (e.g. tapping foot to indicate hunger). Individual-specific gestures may be idiosyncratic in nature, or the person may communicate the meaning of the gesture through speech or additional gestures. Idiosyncratic gestures are assigned meaning by the people who interact with the person most, such as caregivers, siblings, teachers, and speech language pathologists. The meaning of non-idiosyncratic gestures used by nonverbal communicators is determined through consistent use and appropriate reinforcement of that use (Beukelman & Mirenda, 2013; Calculator, 2002). Gestures may also convey the degree or intensity of an emotion or attitude; for example, larger and more emphatic gestures emphasize the individual's message and often depict a stronger stance to the communication partner (Pelachaud, 2009).

Gesture Dictionaries

When an individual with complex communication needs has a repertoire of idiosyncratic gestures used in conversational interactions, creating a "gesture dictionary" is often helpful for partners who did not assign meanings to the gestures or are less familiar partners. Gesture dictionaries describe gestures when meaning cannot be readily ascertained by a new conversational partner. The dictionary may include consistent vocalizations or phoneme approximations specific to the individual. These dictionaries include the following elements: description of the gesture (e.g., movement, vocal/verbalization, behavior), the meaning of the gesture, and the appropriate or desired reaction (i.e., assigned meaning) to the gesture. Some widely recognized gestures may not have the same meaning for the individual as they do for the

general population, thus the gesture dictionary may also dispel such miscommunications and include what an observed gesture does not indicate. For example, a head nod indicates "yes" to the general US population, but an individual with complex communication needs may use a head nod to indicate excitement. These dictionaries may be in the form of a poster hung in the classroom, or a portable handheld booklet to be carried with the conversation partner (Beukelman & Mirenda, 2013). Table 1 illustrates a sample gesture dictionary.

What (name) Does	Meaning	Preferred Reaction
Points to eyes	Let me see	Bring the object closer to her range of vision or hand her the desired object.
Reaches out hand	I need help	Respond according to situation.
Lays head on your shoulder	I'm tired I'm feeling affectionate	Sit calmly until she lifts her head.
Puts hand to mouth Taps mouth with forefinger Manual sign for "more"	Wants food	If it's mealtime, help her to get her lunch. If it's not mealtime, tell her when mealtime will occur.
Claps hands	I'm excited/happy	Respond according to situation and environment.
Rigid arms	I don't like this I don't want to do this anymore	Show her the day's schedule. Put a calming hand on her shoulder.
Smile	Spastic muscle contraction Does *not* indicate happiness	Continue with activity.

Table 1: Sample Gesture Dictionary

Breakdowns in Social Communication.

Children and adults with complex communication needs who support communication via AAC may have unconventional methods of social communication and for initiating social interaction. Children who communicate with AAC reportedly initiate fewer interactions than typically developing children of the same age (Bedrosian, 1999). This may be attributed to the desired/intended communication partners not understanding their methods of interaction. Even when a child initiates an interaction, if the interaction is not sustained by both communication

partners, social closeness cannot be obtained. Sustained interactions may be difficult to achieve for various reasons. Nonverbal children with severe physical/communication impairments most often use facial expressions and body movements in interactions (Houghton, Bronicki, Guess, 1987). These facial expressions or body movements may be obscure or unique to the individual and therefore difficult for communication partners in various social circles to understand. The less familiar communication partner may not understand the child's personalized gestures used to depict certain meanings. S/he may not understand vocalizations or imprecise articulation in the child's attempted speech. Socially active nonverbal children may become frustrated because the desired message may take excessive time to explain or be prohibitively complicated to relay. These children often act out in ways that gain or maintain attention through behaviors (e.g., outbursts, aggression (Durand & Carr, 1991; Kennedy, Meyer, Knowles, & Shukla, 2000). The child may simply lose interest in the conversation because of the communication barriers and consequently end the conversation by walking away or beginning another activity (Reichle, Feeley, & Johnston, 1993).

Social Circles.

Every individual communicates with people who can be categorized into various social circles. In Social Networks (2003), Hunt-Berg and Blackstone present various social circles in a person's life in the context of complex communication needs. The procedure targets balanced social interactions and involves identifying individuals in each of the person's social circles: (1) lifelong partners (e.g., parents, siblings, close family members), (2) relatives and close friendships, (3) neighbors and acquaintances (e.g., classmates), (4) people who are paid to interact (e.g., teachers, classroom assistants), and (5) unfamiliar partners or strangers (e.g., shopkeepers, community members).

Presentation of Problem

For a person with severe-profound disabilities and complex communication needs, the most commonly occurring interactions often remain in Circles one and four only; solely involving immediate family and paid workers (Blackstone & Hunt-Berg, 2003). Paid workers include special education teachers, tutors, speech-language pathologists, physical therapists, occupational therapists, and other people who assist the individual in daily life and receive money for providing services. In the absence of social interaction that is required to develop close friendships, peers in the classroom are largely included in Circle 3, that of acquaintances. Even though the individuals in the classroom see each other daily, if they do not interact socially, they do not experience the level social closeness required to develop a relationship in each others' Circle 2. Social communication breakdowns occur less frequently between communicators in Circle 1 because communication partners often know the individual's idiosyncratic gestures and may anticipate needs before even producing a full utterance or gesture (Bedrosian, 1999).

Ideal AAC Communication Partners

People who have experience interacting with individuals with disabilities are more receptive to interacting with people who communicate with AAC (Beck & Dennis, 1996). Because many social interactions require a communication partner who is skilled in AAC and in communicating with individuals with disabilities to sustain the interaction, the classroom may be the best place to begin expanding an individual's social networks (Lund & Light, 2007).

When communicating with individuals with complex communication needs, certain techniques may facilitate comprehension and increase the overall number of conversational turns. These techniques include expectant delays, modeling social interactions on the AAC

device, positioning to optimize joint attention, AAC device placement, and responding to communication attempts. Expectant delays increase the opportunity for individuals who communicate with AAC to participate in social interactions by providing them additional time to develop an appropriate response. Expectant delay consists of (1) a statement made by a conversational partner, followed by (2) a pause during which the conversational partner makes eye contact to indicate s/he expects a response. Communication partners who model message production on the AAC device during social interactions render an increased number of turns in social conversations (Light, Parsons, & Drager, 2002; Mirenda & Iacono, 2009). In addition, positioning of the child, communication partner, and AAC device facilitates joint attention in a conversational exchange and is crucial to the quality and duration of social interactions. Placing the device in the same line of vision for both the individual with complex communication needs and the conversation partner makes access and modeling by the conversation partner more facilitative for social communication because of the decreased attention shifting associated with the use of an AAC device (Mirenda & Iacono, 2009). Responding appropriately to all utterances made by an individual who communicates with AAC also enhances social interactions and encourages participation in conversations (Mirenda & Iacono, 2009).

Training peers about conversational techniques (e.g., expectant delays, modeling, positioning, responding) for communicating with individuals who use AAC increases success in social interactions (Light, Lund & Seligson, 1998). Light et al (1998) trained three typically developing peers of two six-year-old children and one four-year-old child regarding expectant delay and modeling use of AAC during free play interactions. During the 20-minute free play periods, the number of turns taken by the children who used AAC increased after their peers had

been trained in these techniques. The peers also reported increased ease and enjoyment of interactions following the training (Light, Parsons, & Drager, 2002).

Thesis

This research examined social communication among middle school students enrolled in an Intellectually Disabled, Severe (IDS) classroom and typically developing peer volunteers. Objective and subjective measures were utilized, providing a comprehensive inspection of types, methods, and amount of social communication among participants in the classroom. Data were recorded using graphs to tabulate social communication by communication methods used along with differentiating a variety of social intents (Appendix A).

Current literature has primarily focused on social interactions among young children and their typically developing peers; however, as discussed, students develop social interaction skills largely during middle school. As a result, this investigation aimed to evaluate three key aspects of social interaction: (1) whether social interaction occurs among middle school students enrolled in an Intellectually Disabled, Severe (IDS) classroom and typically developing peer volunteers; (2) which methods of interaction are most used by students enrolled in an IDS classroom before and after provision and training of social vocabulary on AAC devices; and finally, (3) whether provision of a social interaction page on individual participant's AAC devices in conjunction with a peer volunteer training program changed the occurrence of social interactions among communication partners.

Research Questions

1. Does social interaction occur among middle school students enrolled in an *Intellectually Disabled, Severe* (IDS) classroom and typically developing peer volunteers?

2. Which methods of interaction are most frequently used by students enrolled in an IDS classroom before and after provision and training of social vocabulary on AAC devices?

3. Does provision of a social interaction-specific page of messages on individuals' augmentative & alternative communication (AAC) device in conjunction with a peer volunteer training program change the occurrence of social interactions among communication partners?

Methodology

This study followed the guidelines of the East Carolina University Institutional Review Board (Appendix B). Written parental consent for all participants was obtained prior to enrollment in the research. This section will describe participant selection and participation, as well as the methods used to collect and analyze data on participants' social interactions.

Participants

Two Intellectually Disabled, Severe (IDS) students and three peer volunteers (PVs) participated in the study. Individuals enrolled in the Intellectually Disabled, Severe classroom at E.B. Aycock Middle School in Greenville, NC participated in the study, and peer volunteers enrolled in a class designed to assist the IDS classroom were invited to participate as peer volunteer participants. Approval was obtained from the Pitt County Schools research coordinator, the principal of E.B. Aycock Middle School, and the classroom teacher prior to study initiation. Participants in the IDS group had varied diagnoses and used different AAC devices, based on individual communication needs.

Participant inclusion and exclusion criteria.

Potential IDS participants were included if they were enrolled in the IDS classroom and used AAC to support their communication. Potential peer volunteers were included if they had enrolled in the elective peer volunteer course offered in the middle school curriculum and were involved in the IDS classroom. Potential participants were excluded if they or their parents refrained from providing consent for participation or the peer volunteers did not indicate assent. Students in the IDS group were not asked to provide assent due to impaired cognitive status. Peer volunteers who attended the IDS classroom to volunteer as part of a personal behavior

modification plan were also excluded from the study due to inconsistent attendance and potential emotional instability. IQ was not a factor for inclusion in the study.

Peer volunteers register for an elective class in their middle school curriculum. Upon enrollment, they receive training for two weeks; this training targets gaining understanding of the classroom's daily schedule and lesson style through observation. Peer volunteer education also includes assistive technology (e.g., Tap-It, SmartBoard, Morning Meeting) and activities. This training does not provide knowledge of AAC devices or communication methods. After the two week training, peer volunteers are paired with an IDS student each day so that they may assist with individual activities and classroom lessons. The peer volunteers are typically developing middle school students, and as such have not taken classes that train them in the use of AAC devices and have not been previously exposed to the AAC technologies.

Procedures

To identify current communication methods and needs, the IDS classroom teacher was interviewed regarding the student participants in her classroom and their individual methods of social interaction. To obtain more details regarding methods of communicating social interactions, parents of each IDS participant were also interviewed with the same instrument. The interview asked parents and the teacher to describe idiosyncratic gestures, vocalizations, and other forms of communication that the child uses to interact socially (Appendix C). Responses to these interview questions were used to create individualized gesture dictionaries for each IDS participant, which was used to guide Peer volunteers in social communication with IDS participants who use idiosyncratic gestures in daily communication interactions. Two IDS participants (IDS1 and IDS 2) and three PV participants (PV1, PV2 and PV3) were included in the study.

Baseline.

Participants' social interactions were videotaped in the classroom using a wide-angle camera (SONY HXR-MC50U) focused on all participants (i.e., IDS, PV). Baseline data were collected in 1-hour sessions throughout November 2012 on five different days. Sessions were scheduled during the time in the school day when each IDS student was assisted by a PV; their interactions involved selection and completion of a preferred lesson or activity.

Subsequent analyses of the recordings were used to indicate baseline performance for the following dependent variables: the number of social turns taken by each IDS participant, and the methods used by each IDS participant to communicate socially. Any methods of initiating or maintaining social interaction not reported by the teacher or parents but observed during baseline were noted and added to the IDS participant's gesture dictionary for use during the Treatment condition.

Communication System Development.

After baseline data were collected, a comprehensive Gesture (GES) dictionary was composed for each IDS participant, based on results of the parent/teacher interview and any additional baseline observations. The GES included signals used by the IDS participant to initiate or maintain social interactions and idiosyncratic gestures that have various meanings specific to the individual. Each gesture listed in the GES related to communicative intents which would be relevant for social interactions, but were not limited to social meanings. For example, gestures used to obtain attention from others may be used in social communications, but may also be used to relay pain or need to use the restroom. The study treatment involved two components, one training component directed at the PV participants and one provision of social interaction messages/symbols directed at the IDS participants.

Treatment: Peer Training Component

The PVs were trained using a standard lesson plan (Appendix F). The investigator provided the individualized IDS participant gesture dictionaries (Appendices D and E) to each PV. Next, the investigator gave a 15-minute Microsoft PowerPoint® supported instruction to each individual PV participant about strategies for communicating with individuals who use AAC. The training focused on: gesture dictionary use and importance; providing models with the gesture dictionary to nonverbal communicators; giving opportunities for communication by implementing expectant delays, focused attention, positioning of conversation partners, and positioning of AAC devices; and providing appropriate responses to gestures and utterances. The investigator described each concept, demonstrated an example of each, and responded to questions. The investigator illustrated specific examples directly from each IDS participant's gesture dictionary for each concept. Upon completion of the PV training, the participants returned to the classroom and resumed the day's schedule. The investigator followed up with each PV two days after and again one week after the training sessions to check comprehension and recall of learned information and reiterate details specific to each IDS participant. Comprehension was checked by asking PV participants to provide specific examples of each concept discussed in the training and how they would apply these examples to each IDS, which was referred to as "teachback" method.

Treatment: Social Vocabulary Component

A social communication page was added to each IDS participant's current AAC device on the same day that PV participant training was completed. The symbols/messages varied because there were customized to each IDS participant and their individual AAC device. For example, IDS One's dynamic display AAC device contained more complex vocabulary than IDS

Two's static display device that only displays four messages. Still, each AAC device display was designed to include messages with non-obligatory comments, greetings, small talk, and farewells. Individual training to familiarize each IDS participant with the social communication format was provided in the classroom during "free choice time". The investigator provided this training by modeling appropriate use of the messages in a social context and demonstrating appropriate consequential reactions to IDS participants' use of the social messages. For example, the investigator activated the AAC device and directed the IDS participant's attention to the social communication messages; established joint attention through verbal and visual prompting; and modeled appropriate use of each message. After the investigator's model, each IDS participant conveyed the messages (only with minimally necessary cueing) and the investigator responded appropriately.

After both training components were completed, the investigator met with each PV participant individually for two minutes to instruct them on navigation to the IDS participant's social messages in their respective AAC device. The explanation included activating the device (i.e., on/off), selection method (i.e., eye gaze, finger touch), and the "Home" and "back" commands on the dynamic display device.

Upon completion of the PV and IDS training, the participants returned to the classroom and resumed the day's curricular schedule. One session of data collection was completed at this time. Subsequent data were collected in the IDS classroom on a weekly basis when each IDS participant, assisted by a PV, selected and completed a "preferred lesson/activity."

Intra-rater Reliability

Because the investigator completed all ratings, intra-rater reliability was calculated. Intra-rater reliability was established through the following procedure: the investigator analyzed all

data and transcribed each social communication onto the rating sheet. Each one-hour session was transcribed twice to ensure accuracy with transcription of nonverbal communication and AAC use. Agreements and disagreements were counted, and the ratio of agreements to disagreements was calculated to be 93%.

Results

Participants

A total of five middle school students participated in this study: two IDS participants and three typically developing PV participants. Table 2 illustrates the demographic information for all participants. All participants were female, with ages ranging from twelve to sixteen years. The two IDS participants were in 8th grade; one PV was in 6th grade, one in 7th grade and one in 8th grade. Both IDS participants were receiving speech therapy at school; neither participant's speech therapy targeted pragmatics or social interactions. Pre-treatment data collection occurred during five sessions in November 2012. Post-treatment data collection occurred during three sessions in December 2012.

Table 2. Participant Demographics

Participant	Age	Gender	Ethnicity
IDS 1	16	F	Caucasian
IDS 2	15	F	African-American
PV 1	11	F	Caucasian
PV 2	12	F	Caucasian
PV 3	13	F	Caucasian

Social Communicative Interactions

Figure 1 displays the number of total IDS participant communicative interactions summed for all social communication measurements. These communicative interactions included nonverbal methods and all AAC social communication produced by the IDS participants. As noted in Figure 1, a substantial increase in communicative interactions was observed for IDS1 post treatment. Although IDS2 did not show an increase, she did maintain the number of

communicative interactions observed at baseline. Additional discussion related to individual participants is presented below.

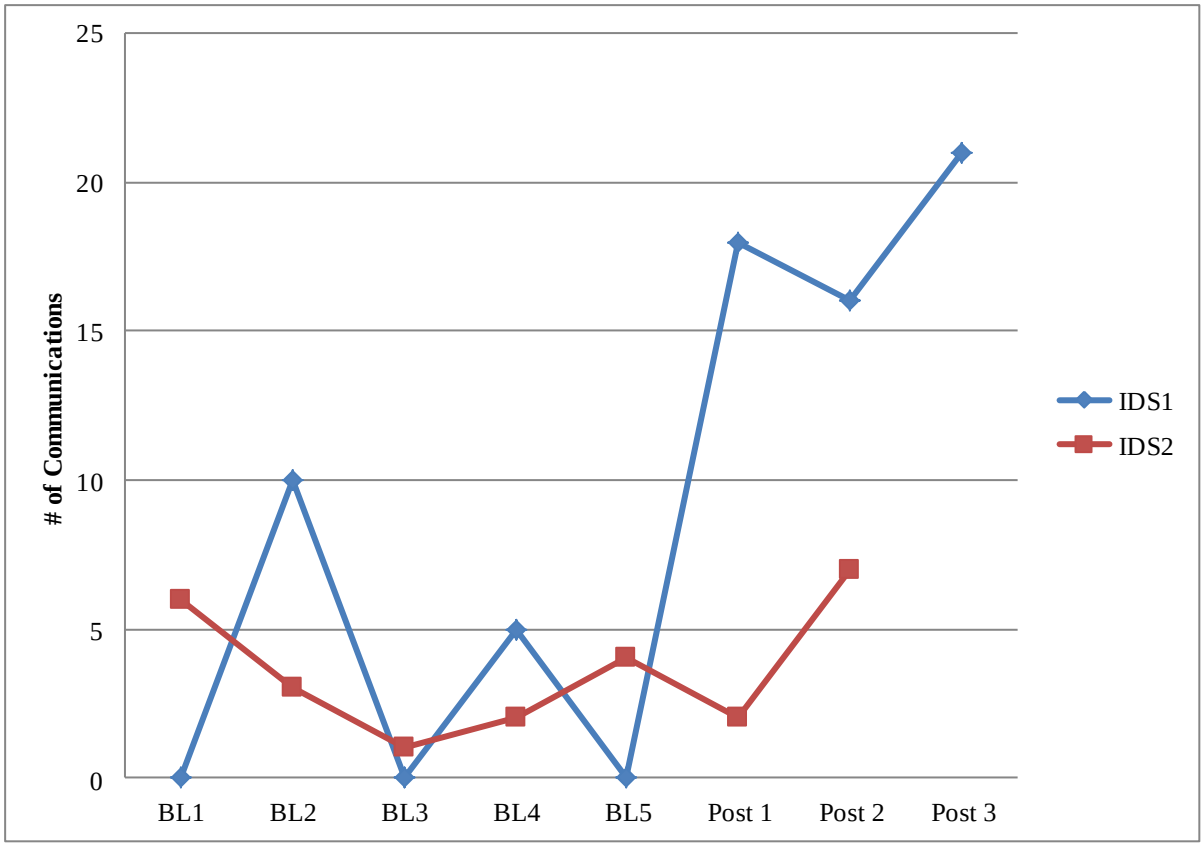

Figure 1. IDS Participants Social Communications at Baseline (BL) and Post Treatment

Participant IDS1

During pre-treatment baseline measurement, the mean number of social communications per session for IDS1 was three. Figure 2 shows social communication types and methods observed at baseline. IDS1 primarily used nonspecific vocalizations (33%) for social communicative interactions. These were idiosyncratic in nature and resulted in reduced intelligibility and were limited to specific situational contexts. Due to their unique nature, these idiosyncratic vocalizations most likely resulted in decreased PV social communication and/or

appropriate responses (Bedrosian, 1999). Prior to training regarding the participant's idiosyncratic gestures and AAC device, PVs were unfamiliar and thus unable to respond appropriately to the IDS' communicative attempts or redirect communication to the more intelligible AAC device. Post-treatment data revealed a mean of 18 social communications per session (Figure 3). The calculated percent of change [PC= 4-3.2/3.2 = 0.25 * 100] indicates a 25% overall increase in social communication. Multiple data collection sessions show a trend toward stabilization of increasing social communication post treatment.

Although both IDS participants used primarily nonspecific vocalizations prior to treatment, over 30% of social communications post treatment used the participant's AAC devices, demonstrating a shift in primary method of social communication toward the more intelligible option. Although the IDS1 was not observed independently using the investigator-designed social communication messages during data collection sessions, she appropriately used previously present messages for social communication with intermittent prompts from PVs.

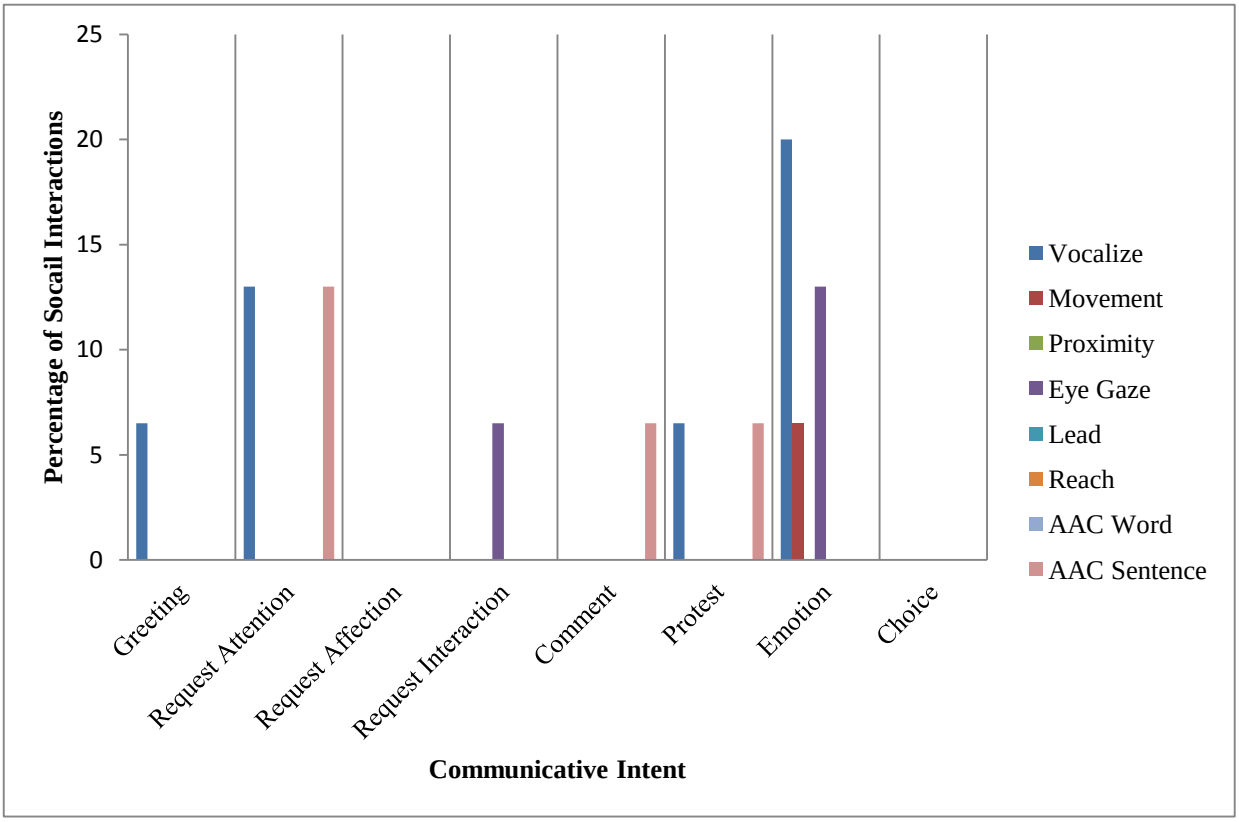

Figure 2. Social Communication at Baseline: IDS1

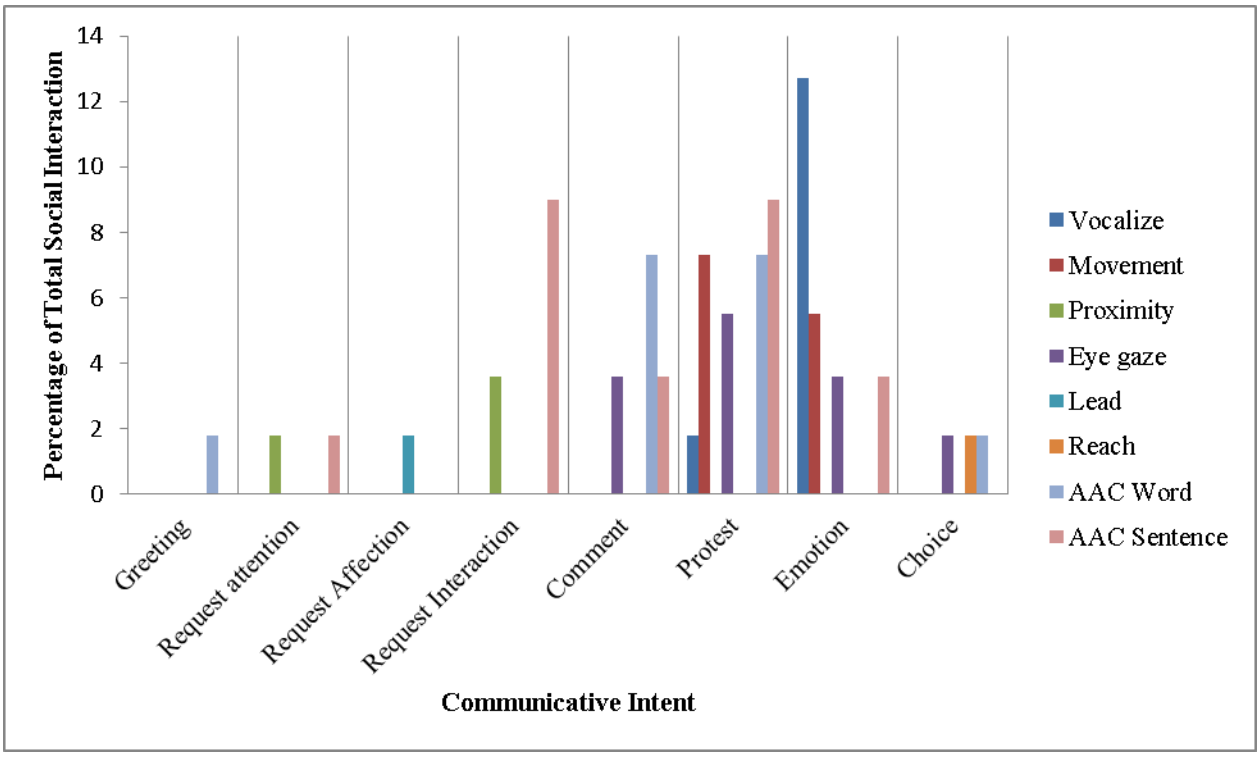

Figure 3. Social Communication Post Treatment: IDS1

Participant IDS2

During baseline measurement, IDS2 produced a mean number of 3.2 social communications per session. Figure 4 shows social communication types and methods during baseline measurements for IDS2. The post-treatment measurement revealed a mean of four social communications session (Figure 5). The calculated percent of change [PC= 4-3.2/3.2 = 0.25 * 100] indicates a 25% overall increase in social communication. Although a smaller increase from that observed with IDS1, the increase is evident in social communicative interactions following the treatment. It should be noted that she increased use of her AAC device for social communication post treatment. The mean pre-treatment use of the AAC device for social interactions was 17%, compared to 67% post-treatment. It is also noteworthy that each time IDS2 used her AAC device during baseline she required hand-over-hand or tactile cueing, whereas use of her AAC device for social interactions post-treatment did not require these cues. This indicates an increase in independent AAC interaction following treatment with social communication activities.

Many factors may have affected IDS2's treatment outcome. Data were not collected for IDS2 on the final scheduled session (December 7) because she received a new dynamic display AAC device that morning. Upon receipt of the new device, all previously used (low-technology) AAC devices were removed from her use to facilitate focus and interest in the new device. It is unknown whether IDS2 would have increased social interactions had she been provided the additional week of interaction and practice with her existing AAC system. IDS2 also received services from a professional aide to assist with device maintenance and interactions. The aide did not participate in the social communication treatment and it is unknown what impact this person may have had on social interactions with peers.

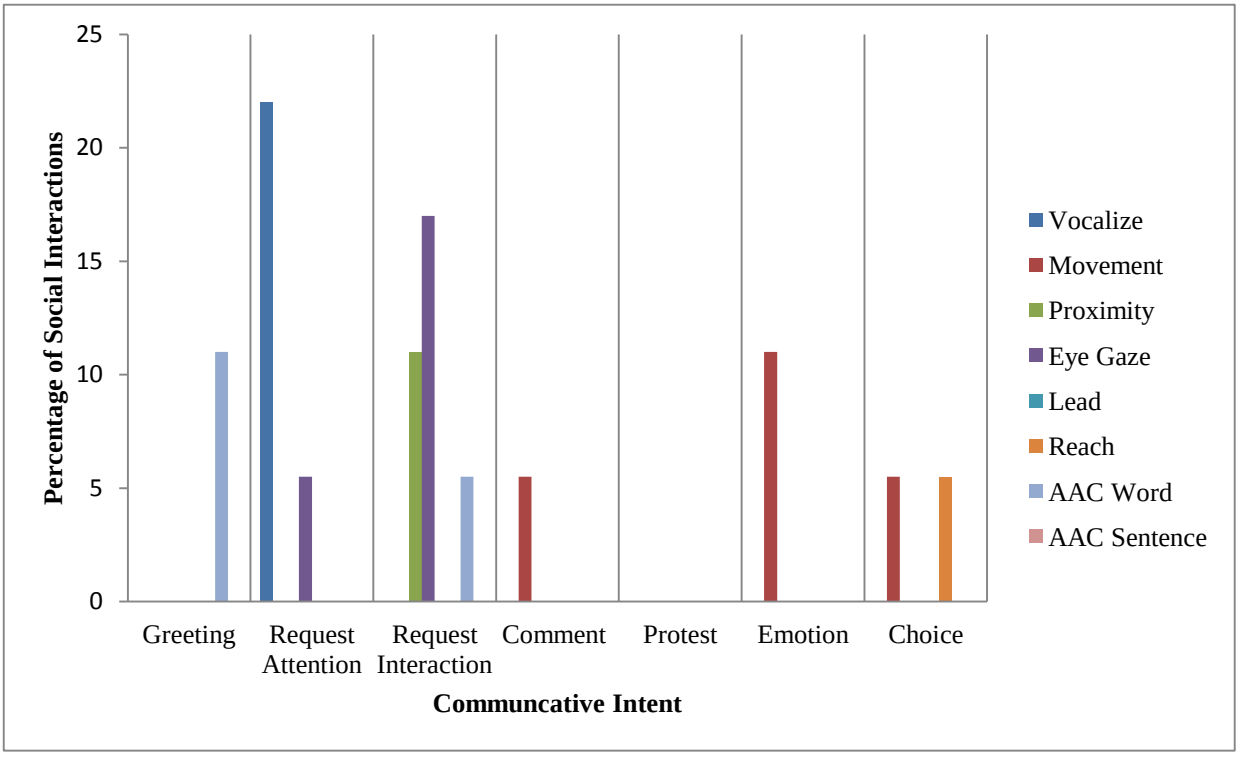

Figure 4. Social Communication at Baseline: IDS 2

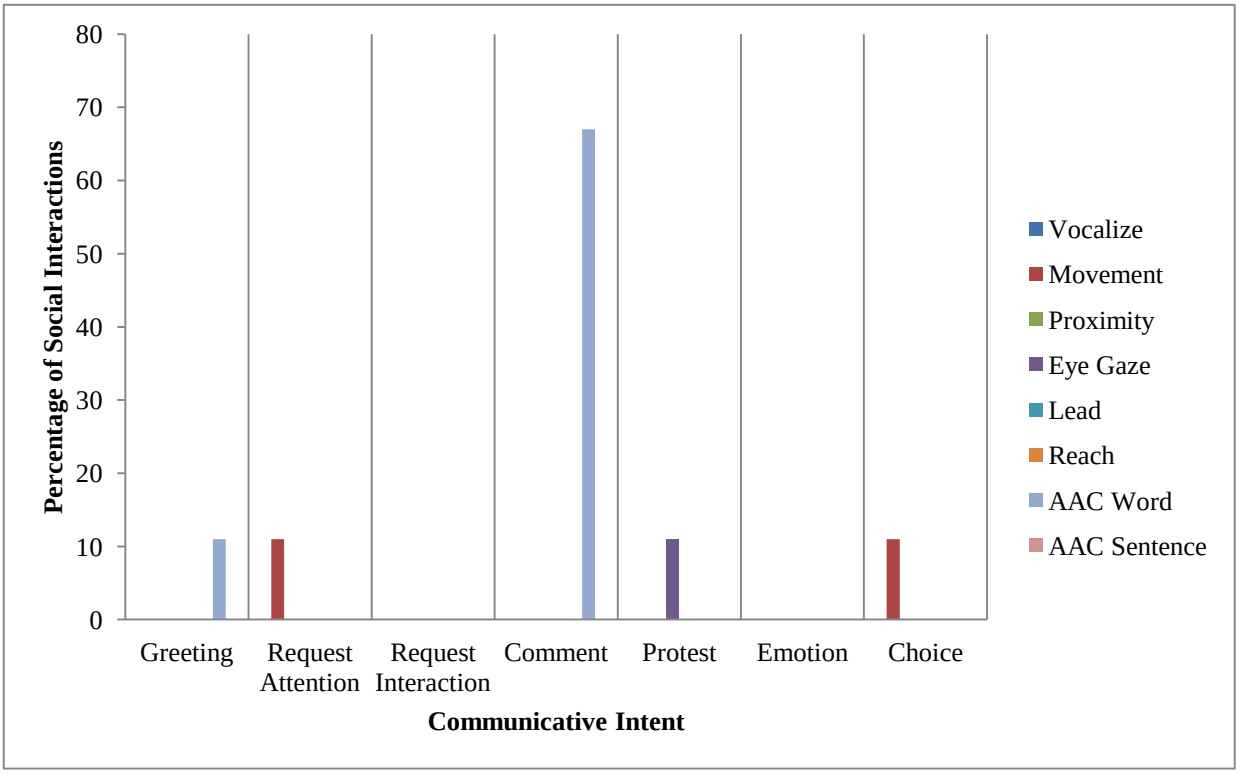

Figure 5. Social Communication Post Treatment: IDS2

Overall, IDS participants demonstrated an increase in social communication after treatment. During pretreatment, the two IDS participants produced a total of 33 social interactions and at post-treatment produced a total of 64 social interactions with PVs. The calculated percent of change [PC= 55/33 = 3.0556 * 100] indicates a 166.67% overall increase in social communication.

Peer Participants

Change in social communication occurred for both IDS and PV participants. PVs were not paired with the same IDS participant each day, which made localization of elicited improvement difficult to analyze. Figure 6 illustrates baseline (BL) and post treatment social interaction data from PV1, PV2, and PV3.

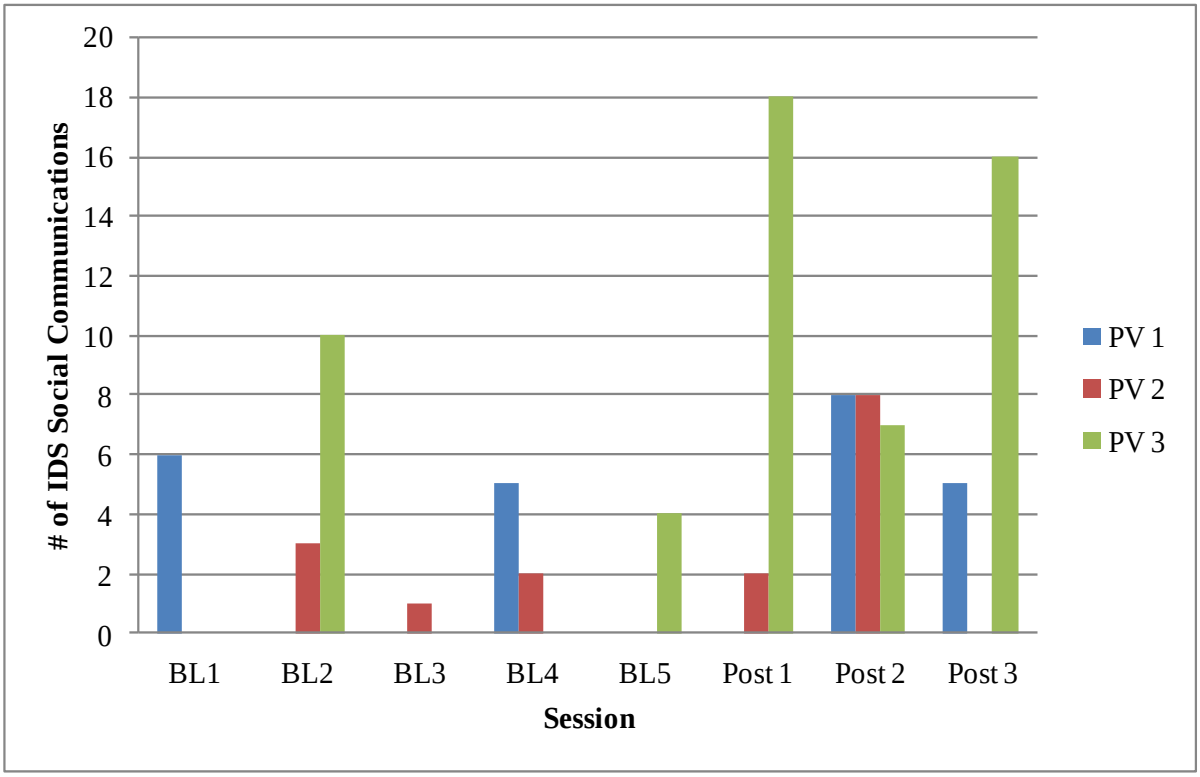

Figure 6. PV-IDS Social communication at Baseline (BL) and Post treatment

PV1 demonstrated a baseline mean of 5.25 social communications with IDS participants per session and a post treatment mean of 6.5 social communications per session [6.5-5.25/5.25= 0.24, or a 24% increase). During baseline, PV1 was first paired with IDS2, and then with IDS1 for the third and fourth baseline sessions. During post-treatment, PV1 was paired with IDS1 only. Social communication increased between PV1 and IDS1 from a mean of 2.5 pre-treatment to a mean of 6.5 post-treatment social interactions. The calculated percent of change [PC= (6.5-2.5)/2.5 = 4/2.5=1.6 * 100] indicates a 106% overall increase in social communication.

PV2 demonstrated a baseline mean of 1.2 social communications with IDS participants per session. Post-treatment, PV2 participated in two sessions, with a resulting mean of 5 social communications [Percent Change=(5-1.2)/1.2=3.8/1,2=3.167, or a 317% increase]. During baseline, PV2 was paired with IDS1 for two (i.e., 1st, 5th) sessions, during which the two participants engaged in zero social interaction. During the only post-treatment session together (2nd), IDS1 communicated socially with PV2 eight times. The calculated percent of change [PC= (8-0)/0=0.000] is not limited, and indicated as "infinitely higher" social communication. PV2 was paired with IDS2 for three baseline sessions (2nd, 3rd, 4th), and in only one post-treatment data collection session (1st). Baseline sessions translated to a mean of two social interactions, and post-treatment resulted in two social interactions. Therefore, increased social communication occurred between PV2 and IDS1. Additional data collection sessions would be necessary to clarify social interactions between IDS2 and PV2.

PV3 demonstrated a baseline mean of seven social communications per session. Post treatment, PV3 participated in all data collection sessions, which yielded a mean of 13 social communication interactions with IDS participants. The calculated percent of change [PC= (13-7)/7=6/7=.86 * 100] indicates an 86% overall increase in social communication. PV3 produced

the highest number of social communication interactions with IDS participants out of all peer volunteers, yet an increase in social communication interactions still occurred as a result of social communication training.

Examination of social interactions among each PV and IDS participant indicates that there was no individual PV who facilitated more social interactions with the IDS participants. For example, IDS1 demonstrated large growth in social communication post treatment. However, because she worked with many different PV one may speculate that she demonstrated growth because of the training program rather than because of elicitation proficiency of a specific peer volunteer. This non-specificity depicts that the PV training program improves social interaction skills by typically developing middle school students by providing education and methods for facilitation of social interaction with IDS students who use AAC.

Classroom Teacher Anecdotal Results

The classroom teacher participated in interactions with the investigator discussing the study two months after the last data collection session. She stated that she observed idiosyncratic gestures made by the IDS participants which depicted "excitement" while using their social communication pages with the PV participants. She also relayed that the IDS participants required verbal or hand-over-hand prompts to use new social communication pages directly following introduction of the pages to their devices. However, because the PVs had been trained with appropriate responses and techniques for communication with people who use AAC, the IDS participants communicated with greater independence after initial cued use. She stated that overall, social communication became increasingly independent for both of the IDS participants.

According to the classroom teacher, the PVs appeared more "comfortable" communicating socially with IDS students after the PV training, which she observed through

increased interaction and nonverbal cues. She noted that PVs initiated more interactions with IDS participants after completing the treatment. In addition, the teacher reported that PVs began asking open ended questions rather than yes/no questions. According to her, these changes maintained frequency after the study ceased. For example, the IDS teacher relayed that after the semester change when PVs began their next elective class and ceased volunteering in the IDS classroom, they all continued to stop by the classroom simply to initiate social communication with the IDS participants, as well as other students in the classroom who had not participated in the research.

Discussion

The main purpose of this study was to determine whether social communication occurs between middle school students enrolled in an IDS classroom and typically developing peer volunteers; which methods of interaction are most used by students enrolled in an IDS classroom before and after provision and training of social vocabulary on AAC devices; and whether provision of a social interaction page on individuals' AAC devices in conjunction with a PV training program changed the occurrence of social interactions between communication partners.

Research Questions

The first research question asked whether social communication occurs between middle school students enrolled in an IDS classroom and typically developing peer volunteers. This study found that, without training, minimal social interactions occurred between participants during the school day. At baseline, IDS1 demonstrated an average of 3 socially communicative interactions and IDS2 demonstrated an average of 3.2 socially communicative interactions.

The second research question asked which methods of interaction are most used by students enrolled in an IDS classroom before and after provision and training of social vocabulary on AAC devices. Baseline measures show that IDS1 primarily used vocalizations (33%), and used AAC for 26% of social interactions. Post-treatment increased her AAC interaction as the primary method of social communication to more than 30% of social interactions, and use of vocalizations decreased to 14.5%. At baseline, IDS2 primarily used nonspecific vocalizations, movements, and eye gaze for social communication; each contributed to a total 22% of social interactions. She used AAC for communication in 16.7% of social interactions. Following treatment, IDS2 communicated with her AAC device for 67% of post-treatment interactions, which made AAC the leading method for her social communication. Her use of vocalizations decreased to 0%, movements to 22% and eye gaze to 11%. Therefore,

methods of social interaction changed to more socially acceptable, intelligible, and functional methods in both IDS participants after treatment.

The third research question asked whether provision of a social interaction page on individuals' AAC devices in conjunction with a peer volunteer training program changed the occurrence of social interactions among communication partners. IDS1'smean of socially communicative interactions at baseline was three, increasing to a mean of 18 post-treatment (500% increase). IDS2's mean of socially communicative interactions at baseline was 3.2, increasing to a mean of four post-treatment (25% increase). Both participants increased social communicative interaction with typically developing PVs; still, for undetermined reasons, IDS1 increased substantially more than IDS2.

Importance of Peer Training

The results of this investigation reveal the importance of training for peers who interact with Intellectually Disabled, Severe students who use AAC Devices. In the two cases presented, the initial PV training session which occurred at the beginning of the school year was insufficient to establish optimal social interaction among middle school IDS students and their typically developing peers. As a result, specific training regarding AAC devices and idiosyncratic gestures was added and found to improve social interaction in the classroom not only immediately, but after two months.

Both IDS participants demonstrated an increase in use of AAC devices for social communication after the treatment, although data did not specifically reflect IDS participant use of the social communication messages programmed and provided by the investigator. Peer volunteers were observed adjusting their proximity to IDS participants, to sit/stand in the same

line of vision, reducing the shift of attention and increasing ease of communication suggested by Mirenda & Iacono (2009).

IDS Classroom Teacher Response

Anecdotal interactions between the investigator and the classroom teacher two months after the final data collection revealed reports of lasting changes in social communication interactions among the IDS students who use AAC devices and their typically developing peers. These changes suggest that intervention for both peers and students resulted in both immediate interactions and months following treatment. This long-term change may be important to middle school age students, contributing to the establishment of social closeness with their same-age peers, and providing an avenue for expanding their circle of close friends.

Potential Limitations

This project contains limitations which must be considered. Sample size was the biggest limitation in this study, with five participants; two IDS students and three PV middle school students. The IDS participants were all from the same classroom. Further investigators may consider obtaining participants from different classrooms and from different classroom teachers.

The Hawthorne Effect asserts that those who know they are being observed act differently than they would if unaware of observation. Although the participants are used to being video recorded, the camera used for data collection remained in plain view throughout the school day for optimal capturing of the classroom. Peer volunteers were informed of the study's methods through the consent forms. During the Peer Volunteer training sessions, PVs were reminded about the investigation and its methods. The classroom teacher approved the study in her classroom and was educated on the methods and rationale for the investigation prior to treatment. The teacher was not observed providing cues or additional opportunities for social

communication; however, although unlikely, it is possible that she provided additional instruction regarding social communication for PV or IDS participants while data was not being collected.

Conclusion

Results indicate that implementing a training program for peer volunteers while adding social communication messages to AAC devices used by Intellectually Disabled, Severe middle school students will increase social communication between disabled and non-disabled peers. This treatment protocol should be considered by IDS classroom teachers and Speech Language Pathologists as they implement training for peer volunteers who interact with middle school students who use AAC devices.

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Appendix A

Data collection system for IDS social communication/intent designations

Greet	**Request**				**Comment**	**Protest**	**Emotion**	**Reject**	**Choice**
	Attention	Affection	Information	Interaction					
Vocalize									
Gesture									
Point									
Grab/Reach									
Move									
Proximity									
Eye Gaze									
Lead									
Aggression									
Sign									
Verbalize									
AAC									
1-word									
2+-word									

Appendix B

Institutional Review Board Documentation

EAST CAROLINA UNIVERSITY
University & Medical Center Institutional Review Board Office
4N-70 Brody Medical Sciences Building· Mail Stop 682
600 Moye Boulevard · Greenville, NC 27834
Office **252-744-2914** · Fax **252-744-2284** · www.ecu.edu/irb

Notification of Initial Approval: Expedited

From: Social/Behavioral IRB
To: Sarah Frueh
CC: Laura Ball
Laura Ball
Date: 6/27/2012
Re: UMCIRB 12-000787
Social Interactions in Middle & High School ID, Severe Classrooms

I am pleased to inform you that your Expedited Application was approved. Approval of the study and any consent form(s) is for the period of 6/27/2012 to 6/26/2013. The research study is eligible for review under expedited category #6, 7. The Chairperson (or designee) deemed this study no more than minimal risk.

Changes to this approved research may not be initiated without UMCIRB review except when necessary to eliminate an apparent immediate hazard to the participant. All unanticipated problems involving risks to participants and others must be promptly reported to the UMCIRB. The investigator must submit a continuing review/closure application to the UMCIRB prior to the date of study expiration. The Investigator must adhere to all reporting requirements for this study.

The approval includes the following items:

Name	Description
Methodology | History	Study Protocol or Grant Application
Parental Consent Form | History	Consent Forms
Peer Volunteer Assent Form | History	Consent Forms
Stimulus Development Questionnaire | History	Surveys and Questionnaires

The Chairperson (or designee) does not have a potential for conflict of interest on this study.

IRB00000705 East Carolina U IRB #1 (Biomedical) IORG0000418
IRB00003781 East Carolina U IRB #2 (Behavioral/SS) IORG0000418 IRB00004973

Appendix C

Parent/Guardian, Teacher Interview

1. How does the student get someone's attention? (Vocalization, point, gesture, reach, proximity through moving body closer, self-injury, eye gaze, sign language, verbalizes words, uses AAC device) If gesture, please describe.

2. How does the student end a social interaction? (Walks away, vocalization, eye gaze, gesture, self-injury, sign language, uses AAC device, aggression, movement, grabs/reaches, verbalizes words,

3. List idiosyncratic gestures that the student uses to communicate. (e.g. balling fist to indicate they want a drink, closing eyes to indicate they are tired, placing hand on shoulder to indicate affection)

Appendix D

Participant IDS1 Gesture Dictionary

What [redacted] does	**What it means**	**What you should do**
Walks up next to you	I want to talk to you, pay attention to me!	Say hello
Says "bee"	Pay attention to me! *Sometimes it doesn't mean anything*	Say hello or continue the conversation
Cries	In pain- stomach hurts Pay attention to me! I don't want to do this anymore *Depends on situation*	Tell her that you don't know what she needs, direct her to use device
Closes her eyes	I'm tired I'm done with this	If the activity is mandatory, just say "I know, but we have to finish!"
Looks at something (ex- drink, book, computer)	I want that!	If she can have it, give it to her. If not, say "I know you want that" and then redirect her to the task.
Fusses/whimpers	In pain- stomach hurts I want to leave	Ask her to clarify using device, respond according to situation.
Looks at you	Are you kidding me? I want to talk to you	Respond based on what's going on.

Looking off into space does NOT mean she's done with the conversation.

If she doesn't have her device with her, try not to ask questions she won't be able to answer.

Appendix E

Participant IDS2 Gesture Dictionary

What [redacted] does	**What it means**	**What you should do**
Walks up next to you	I want to talk to you, pay attention to me!	Say hello
Touches your arm, puts her arm around you	Pay attention to me! I want to talk to you	Say hello
Cries	-I'm frustrated because you don't understand me -In pain -Pay attention to me! -I don't want to do this anymore *Depends on situation*	Give her choices when asking what she wants.
Bangs or hits something	I'm done with this *Sometimes she may just like the noise*	If the activity is mandatory, just say "I know, but we have to finish!"
Reaches toward something (ex- drink, book, computer)	I want that!	If she can have it, give it to her. If not, say "I know you want that" and then redirect her to the task.
Fusses/whimpers	I'm done with this I wish you understood what I mean	Ask her to clarify using device by giving choices, respond according to situation.

Appendix F

Peer Training Standard Lesson Plan

1. Explain the paired students' device and basic instructions for navigation.

2. Go over the gesture dictionary for the paired student.

3. Giving opportunities for communication:

- Providing models
- Expectant delay/pause while focusing attention on the communication partner
- Positioning of conversation partners and AAC devices

4. Responding appropriately