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TEACHING SOCIAL COMMUNICATIVE INTENTS TO ELEMENTARY AGED STUDENTS THROUGH THE USE OF AIDED LANGUAGE MODELING

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THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in Education in the
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By

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ABSTRACT OF THESIS

TEACHING SOCIAL COMMUNICATIVE INTENTS TO ELEMENTARY AGED STUDENTS THROUGH THE USE OF AIDED LANGUAGE MODELING

The purpose of this study was to extend the research of using aided language modeling as an intervention with elementary aged students with extensive support and complex communication needs. A multiple probe design across participants was used to determine if there is a functional between an aided language modeling intervention and improvements in contextually relevant initiations (i.e., requests and comments) between children with extensive support and complex communication needs. The results showed that using aided language modeling within play-based sessions was effective in teaching social communicative intents to students with extensive support and complete communication needs.

KEYWORDS: [Moderate and severe disabilities, aided language modeling, social communicative intents, communication, AAC devices]

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12/01/2022
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CHAPTER 1. INTRODUCTION

Communication is an integral part of daily life for all individuals. As children develop communicative competence (Light, 1989), they understand when and how to communicate with others, advocate for themselves by expressing wants and needs, and establish and maintain relationships with others. Part of this process involves meaningfully sharing and interacting with others, otherwise known as social communication. Social communication is critical for children when initiating and maintaining authentic relationships with others. Hollingsworth (2006) identified a considerable link between children that had friendships and positive outcomes associated with academic success, improved language skills, and increased social-emotional development in school; improvements were ultimately associated with short- and long-term improvements in overall quality of life.

In contrast, expressive communication delay directly impacts a child's ability to express themselves, which in turn hinders building relationships with others. A number of options are available to help children reliably communicate their message to others across contexts. Augmentative and alternative communication (AAC) has a long-standing history in the literature and field for serving as a mode of communication. AAC can benefit individuals with complex communication needs by either adding to their speech capabilities (augmentative) or being used in place of their speech (alternative). Thus, the value and utility of AAC has increased over the last few decades, including for children with disabilities. Children who benefit from AAC include those with autism spectrum disorder (ASD) and children with developmental disabilities (Light & McNaughton, 2012).

It is important to be aware of the AAC options available for children, as well as how to teach them to efficiently operate and use systems to communicate.

Historically, for children with disabilities who display complex communication needs, language-based instruction occurred in isolated settings. Instruction eventually shifted to teaching functional communication skills in typical contexts to promote generalized communication (Light & McNaughton, 2014). Children are initially taught to request attention and items or activities of interest first. Such efforts are focused on increasing a child's motivation to communicate to meet their immediate social needs, establishing the power of communication. For example, if a child is unable to express their needs in a manner easily understood by others, frustration in the form of challenging behavior or withdrawal could emerge. Teaching a child how to express themselves creates early opportunities for a child to gain access to preferred items and activities (reinforced immediately), which will likely lead to the child communicating in a similar manner in the future. While teaching individuals who use AAC to request is common, functional, and reduces challenging behaviors, additional research is needed for teaching children with complex communication needs to improve social relationships, including giving information, seeking information, and commenting (De Leo et al., 2012).

Through various intervention procedures, individuals with complex communication needs who use AAC are able to learn how to effectively communicate social intents including specific requests, greetings, answering questions, and social etiquette, which can assist them in establishing and maintaining relationships with others (Van der Meer et al., 2013). Friendships between children with and without complex communication needs that use AAC are mutually beneficial and often rated as enjoyable

and positive experiences for all those involved (Anderson et al., 2011). By nature, school provides a multitude of opportunities for interaction for elementary-aged students and their peers. In order to obtain the outcomes of these opportunities, including the development of friendships, students that use AAC need to be able to actively participate in the exchanges.

In considering strategies to instruct individuals in the use of their AAC device, we must consider operational competence, or the ability to complete the skills necessary to operate the device, as well as social competence, or the ability to know when, when not, where, why, how, and in what ways to use the device (Light & McNaughton, 2014). Aided language modeling (ALM) is an instructional procedure that considers both of those factors. The use of ALM instructs an individual on how to use their AAC system to communicate. The communication partner demonstrates how to communicate on the device by using the device themselves to communicate a message while simultaneously using oral speech. (O'Neill et al., 2018) ALM is likely to lead to improvements in receptive and expressive language abilities, as well as an improved overall quality of life (O'Neill et al., 2018) and can be implemented in a child's school, home, and community. There is a significant amount of research regarding the effectiveness of ALM in teaching communication skills to preschool-aged children, but a lack of research that evaluates teaching those same communication skills or more complex skills to elementary-aged children. Elementary schools by nature can provide ample opportunity for children to learn during age-appropriate activities with same-aged peers. The purpose of this study is to extend the research of using ALM as an intervention with elementary aged students with extensive support and complex communication needs.

CHAPTER 2. RESEARCH QUESTION

Is there a functional relation between an aided language modeling intervention and improvements in contextually relevant initiations (i.e., requests and comments) between children with extensive support and complex communication needs? The children with extensive support and complex communication needs recruited for this study used a speech-generating device to communicate. Sessions were conducted during play-based activities with same-age peers.

CHAPTER 3. METHOD

3.1 Participants

Four participants were recruited for this study from an elementary school in the southeastern United States. Participants were selected based on the following inclusion criteria: (a) fluently navigate an AAC device or system to press buttons or make selections by pressing only the intended button, (b) follow a gestural model prompt when an individual points to the buttons on a device at least 90% of the time, (c) attend to visual and verbal stimuli such as materials or verbal cues or directions to use their device to express something, (d) be between the ages of 5 and 11 years old, (e) have a diagnosis that makes them eligible to receive services to address complex communication needs, (f) sit and attend to an activity for at least 10 min, and (g) initiate contextually-relevant requests and comments during play-based activities fewer than 20% of opportunities across two consecutive 10 min observations. For the purpose of this study, complex communication needs were defined as using an AAC device to communicate (Loncke, 2022). Exclusion criteria included (a) using only oral speech to communicate and (b) the inability to use their AAC device reliably or correctly to express communicative intents that was understood by others. In order to screen participants, the instructor created opportunities for potential participants to engage in target behaviors. For the final two inclusion criteria, the instructor created opportunities to observe the behaviors during play; contextually relevant initiations were measured and based on the provided definitions later in this manuscript (see *Dependent Variables and Measurement System* section). After screening was complete, the instructor identified four participants who met the inclusion criteria.

3.1.1 Annabelle

Annabelle was a 9-year-old, White female student with multiple disabilities including Cerebral Palsy, Esotropia, Cerebral Visual Impairment, and Strabismic Amblyopia of the left eye. She communicated using a variety of communication modes such as vocalizations, gestures, and a speech generating device with a dynamic display. Annabelle used an AAC device consisting of an iPad mini with TouchChat software, accessed via direct selection, throughout the study. She had been using her device for 3 years prior to the beginning of the study. At the time of the study, her IEP goals related to communication included following sentence structure templates to communicate and answering "who" and "what" questions related to the context of a structured language activity. Annabelle demonstrated strength in the academic areas of auditory comprehension after being read a story or passage, using a calculator to solve math equations after being provided with a written model, typing sentences from a model, and demonstrating understanding of classroom rules and expectations. She was consistently able to follow 1-2 step directions related to her school routine and familiar tasks, but occasionally required additional prompting to follow through when directions were unfamiliar or to follow through with the second step.

3.1.2 Hannah

Hannah was a 9-year-old, White female student with multiple disabilities including Joubert Syndrome, Cerebral Palsy, Retinal Dystrophy, nystagmus, and scoliosis. Hannah communicated through a variety of communication modes such as gestures, simple signs,

laughing, crying, and the use of a speech generating device with a dynamic display and key guard. Hannah used a Forbes Winslate with Grid3 software and a magnetic keyguard, accessed via direct selection throughout the study. She had been using her device for 3 years prior to the beginning of the study. At the time of the study, her individualized education program (IEP) goals related to communication included utilizing expanded utterances of 3 or more words and targeted grammatical markers using multi-modal communication. Hannah demonstrated strength in the academic areas of auditory comprehension after being read a story or passage, using an enlarged and talking calculator to solve math problems when given a model, and demonstrating understanding of classroom rules and expectations. She was consistently able to follow 1-2 step directions related to her school routine and familiar tasks, but occasionally required additional prompting due to mobility limitations.

3.1.3 Debbie

Debbie was a 9-year-old, white female student with a primary disability of autism. She was able to communicate through modes such as facial expressions, gestures, simple signs, laughing, crying, and a speech generating device with a dynamic display. Debbie used an iPad mini with Proloquo2go software, accessed via direct selection throughout the study. She had been using her device for 3 years prior to the beginning of the study. At the time of the study, her IEP goals related to communication included commenting on or describing using 1-3 word messages during language based activities. Debbie demonstrated strength in the academic areas of identifying basic sight words through pointing or using her AAC device and demonstrating understanding of classroom rules and

expectations. She was consistently able to follow single step directions without additional prompting, especially when related to her school routine and familiar tasks.

3.1.4 Dax

Dax was a 7-year-old, white male student with a primary disability of autism. He was able to communicate using facial expressions, gestures, leading others to what he wanted, and a speech generating device with a dynamic display. Dax used a Tobii Dynavox with Snap Core software, accessed via direct selection throughout the study. He had been using his device for 2 years prior to the beginning of the study. At the time of the study, his IEP goals related to communication included expressing his wants and needs with or without a vocal cue, vocally imitating functional vocabulary, and following a verbal directive. Dax demonstrated strength in the academic areas of physically identifying numbers 1-10 by pointing, counting moveable and non-moveable objects with 1:1 correspondence up to 10 using his AAC device, and demonstrating understanding of classroom rules and expectations. He had been making progress in consistently being able to follow single step directions without prompting, specifically related to familiar task directions that were part of his daily school routine.

3.1.5 Same-age Peers

Similarly-aged peers participated in student dyads with the instructor and participants in this study. Inclusion criteria for the peers were as follows: (a) between 5 and 11 years of age, (b) sit and attend to an activity for at least 10 minutes, (c) available to participate in sessions, and (d) independently communicate wants, interests, and feelings

with others at an age-appropriate level. The instructor conducted observations and based the selection of peers on anecdotal notes and feedback from other adults in the classroom. Additional information and data were not collected for peers, as they were not the focus of this study.

3.1.6 Others

The special education instructor was the primary interventionist in this study and had been the case manager for all four participants ranging from 6 months to 4 years. She previously received a bachelor's degree in special education. She obtained teaching certification for moderate and severe disabilities (MSD) and had 4 years of teaching experience as a special education teacher. At the time of the study, she was enrolled in a teacher leader special education master's program. She had previous experience with aided language modeling, gained through teaching students who use AAC to communicate and graduate-level classes on teaching communication to students with complex communication needs. Two graduate students were responsible for collecting procedural fidelity and interobserver agreement (IOA) data. The graduate students' qualifications include bachelor's degrees in early childhood special education, and psychology and applied behavioral analysis, and a current enrollment in a graduate program focusing on applied behavior analysis.

3.2 Instructional Setting and Arrangement

All sessions (screening, probe, and instructional conditions) took place in the special education classroom at the participants' public elementary school. All sessions

were conducted in a small group format including a dyad of students, one being a participant within the study, with the instructor sitting across from the participant and peer at an individual student table within the classroom. To control for environmental distractions during sessions, participants consistently sat with their backs to any others that were in the room and directly faced the instructor. Any additional students in the classroom during sessions that were not participating in the study were engaged in small group instruction with paraprofessionals at other tables or desks.

3.3 Materials and Equipment

Materials that were consistent across all sessions included the group table and chairs, as well as various age-appropriate games and activities (e.g., puzzles, board games, card games) for participants or peers to choose for each session. Four speech generating devices were used within this study, each belonging to a different participant. The devices included: an iPad mini (19.54 x 13.48 x 0.63 cm) with TouchChat software, an iPad mini with Proloquo software, a Forbes Winslate 12 (21.06 x 30.71x 1.6 cm) and SnapLock™ Keyguard with CoreWord™ software, and a Tobii Dynavox SC Tablet (25.06 x 17.41 x 0.75 cm) with Snap Core software. Vocabulary used throughout this study was already existent on each particpant's AAC device. No additional vocabulary was added for the purpose of this study. Reinforcers were incorporated into sessions as needed to promote engagement during sessions. Examples of reinforcers included preferred snacks such as goldfish. The researcher and data collectors used Countee (https://apps.apple.com/us/app/countee/id982547332), a mobile app, to collect data on each student's target behavior (see Appendix A for an example).

3.4 Dependent Variable and Measurement System

The dependent variable in this study was the percentage of participants' independent contextually relevant initiations to the instructor during play-based sessions. Contextually relevant initiations were defined as using the AAC device to express comments about activities or individuals or requests for attention, information, or objects that were relevant to the current age-appropriate activity. Examples included requests for game board pieces, asking a peer or adult for help, asking a peer if they like the game, or making a comment about the game. Non-examples include instances of using the AAC device to create repetitive phrases that were unrelated to the activity (e.g., repeatedly saying the word "penguin") or making other comments or requests that are not related to the current activity (e.g., asking to go home, talking about an unrelated activity). Specific contextually relevant initiation targets included either requesting information or game pieces, or making comments. A correct contextually relevant initiation was defined as a participant using their device to independently respond to the instructor following an environmental arrangement (request information, make a comment) within 5 s and completing the response within 15 s; a total of 20 s was selected to allow for visual scanning and motor planning related to the AAC device and to allow for responses that might be longer than one word, thus involving multiple steps. A minimum of three planned opportunities per session were provided, with the number of independent responses divided by total number of opportunities and multiplied by 100. Data were collected using event recording with time stamps to record initiations or the lack thereof using the Countee app, which allowed for marking presence of an initiation by opportunity. Response types and definitions are provided in Table 3.4-1.

Table 3.4-1 Types and Definitions of Responses

Possible student responses	Definition of response
Contextually relevant initiation	A participant using their device to independently respond to an environmental arrangement (request information, make a comment) within 5 s and completing the response within 15 s
Contextually incorrect initiation	A participant using their device to initiate a response that is not contextually related to the environmental manipulation
No response	Does not initiate any response on the AAC device within 5 s of an environmental arrangement

3.5 Experimental Design

A multiple probe design (MPD) across participants (Ledford & Gast, 2018) was used within this study to assess whether aided language modeling was an effective intervention to teach elementary-aged students with complex communication needs who use AAC devices how to initiate social communicative intents. When using MPD across participants, the independent variable is introduced sequentially across multiple participants that exhibit similar behaviors or behavioral deficits under similar environmental conditions (Ledford & Gast, 2018). The expectations across conditions while implementing this design include monitoring the same dependent variable and establishing a clear and predictable pattern on responding across all participants. After stimuli are tested within an initial probe condition, intervention will begin in the first tier while intermittent probe data continues to be taken within subsequent tiers. Once the criterion is met in the first tier and data stabilizes, another probe session takes place immediately before intervention begins in the next tier. Intermittent probe data continues to be intermittently collected in subsequent tiers. This process continues as criteria are met within each tier.

Experimental control is established within this design through ensuring that tiers are functionally independent and functionally similar and seeing changes in the data paths in the desired direction within each condition when and only when the intervention is introduced and internal threats to validity have been controlled. MPD helps to reduce the threat of testing through the use of intermittent probe/baseline sessions instead of test sessions that may provide feedback to the participants that affects their performance within the study.

MPD was chosen for this study because the research question aimed to evaluate the effectiveness of an intervention to teach the targeted behaviors. As social intents can be sensitive to environmental conditions and shift with various conditions, the behaviors under study were potentially reversible, not likely to be learned without intervention. Additionally, considering the importance of these behaviors in helping children to establish and maintain relationships with others, a design that did not end in removing the intervention was needed. Based on this, it was reasonable to implement probe sessions throughout the study. Additionally, MPD was more practical for the instructor to implement within the classroom setting than a multiple baseline design due to the reduced effort required with data collection during the baseline condition, specifically because the special education teacher was the primary interventionist and often had many other factors to handle daily.

3.6 Procedures

3.6.1 General Procedures

Prior to introducing the intervention, participants were randomized to tiers. After this occurred, probe sessions were conducted to establish a pre-intervention pattern of responding in the target behavior for each participant. At least three consecutive probe sessions were conducted or until data are stable across participants. Once stability was established, the intervention was introduced in Tier 1. For all remaining tiers, intermittent probe sessions occurred weekly and immediately before introducing the intervention in subsequent tiers. The criterion for introducing the intervention across tiers was at least 50% growth (added increases) in the dependent variable over responding observed during the pre-intervention condition for three consecutive sessions in Tier 1 and all subsequent tiers thereafter (Lane et al., 2020; e.g., if a participant consistently displayed a median response of 10% in the probe sessions, we looked for improvements of 60% during the intervention condition). In every session across conditions, a minimum of 3 trials were embedded into the play-based activity and sessions were 10 min. All sessions occurred in a small group setting that included the classroom teacher as the instructor, and a dyad of students consisting of one participant and one peer. Each participant was paired with one similarly-aged peer that remained consistent for all of their sessions. Multiple play-based activities were available for participants and peers to choose from for each session. Examples included: Mr. Potato Head figures and accessories, Playdoh, Go Fish, Uno, Pop-Up Pirate, dolls, large Lego blocks, and a memory card game. After an activity was chosen by the

participant or the peer, the instructor and students participated together in the activity for 10 min.

3.6.2 Probe Procedures

The instructor brought both children to a table where a choice between age-appropriate activities was provided. The instructor rotated who got to select the activity for that session. In addition, since the session length was the same across sessions and participants could lose interest, an additional activity will be accessible. The instructor promoted engagement by using age-appropriate activities, providing descriptive praise for attending behaviors and related engagement throughout each individual's turn, and redirecting the participants to the activity, as needed. In addition, when the instructor took her turn with the game, she vocally modeled contextually appropriate language. In addition to these natural opportunities to respond following the instructor's turn, the instructor also provided at least three trials to promote an independent, contextually-appropriate response. Each particpant's AAC device was available and accessible throughout the entirety of each session. During each trial, the instructor established joint attention by orienting herself toward the target student, displaying positive affect, and waiting for the student to orient to her by turning to face her and the materials being used. After joint attention was established, the instructor arranged the environment (e.g., withheld materials, asked questions, engaged in silly situations) and waited up to 20 s for a response (i.e., up to 5 s to begin response and 15 s to complete). During the response interval for each trial, the instructor did not provide an expectant look to the participant.

Withholding materials involved placing items needed for game play in sight but out of reach of the participant, such as holding the container of Legos out of reach after saying "Let's play with Legos!" after that activity had been chosen. Questions asked were related to game pieces or game play, such as "what color swords would you like?" when playing Pop-Up Pirate. Silly situations involved the instructor participating in unexpected behaviors like attempting to juggle the memory cards instead of using them in the expected way or making silly creations or combinations when using activities such as playdoh or Mr. Potato Head were chosen for sessions. All attempts to communicate were reinforced by responding to the request or communication with an age-appropriate response and any related action (e.g., giving an item). If a student communicated using a different intent than those targeted in the study, such as requesting information or greeting, the instructor responded correspondingly by reciprocating the greeting or providing the information requested. If the participant did not communicate in anyway, the trial ended, and the activity continued. The instructor ended the session by providing verbal praise to the participants for engaging in the activity and providing them with a preferred item that they requested.

3.6.3 Aided Language Modeling

Instructional procedures were identical to probe procedures with the exception of ALM. Throughout the activity, the instructor used ALM to make comments and provide language models that were contextually relevant to the activity throughout various times during the activity, including their turn. The instructor based the frequency and type of ALM models on the activity and natural opportunities to embed throughout. For example,

if Mr. Potato head was activity chosen for a session, the instructor chose an accessory such as a blue pair of shoes, and said, “My potato is wearing blue shoes” and pressed “blue” and “shoes” buttons on the participant’s AAC device while simultaneously using oral speech to vocalize those words. Other examples included making comments about the activity or game pieces related to attributes or actions, requesting information or pieces from others as needed for game play, or engaging in silly situations and making comments related to the situation. During the response interval following each trial, the instructor provided an expectant look to the participant.

3.6.4 Planned Modifications

Pre-planned modifications were made when designing the study. Modifications were based on previous recommendations for further helping children recognize when and how to display behaviors using adult supports (Ledford et al., 2019). If after 5 consecutive sessions the participant did not display therapeutic improvements in the target behavior, then a model prompt was to be introduced into the instructional trial. That is, if the participant did not communicate, did not use a contextually-relevant initiation, or took longer than the allotted time (i.e., 20 s), the instructor would directly model a contextually-appropriate response on the device and wait up to 5 s for the participant to begin communication and up to 15 s to complete the response. For example, the instructor could describe a dress on a doll by saying “your doll is wearing a pink dress” and pressing “pink” on the particpant’s AAC device at the same time that the word “pink” was spoken in her sentence. If the student repeated the model, it was recorded as a prompted initiation, and a no response was recorded if they did not repeat the model.

3.6.5 Maintenance Procedures

Maintenance sessions were conducted intermittently (weekly) beginning 1 week after the participant's performance has met the criterion (i.e., demonstrating at least 50% growth in the dependent variable over responding observed during the pre-intervention condition for three consecutive sessions). Maintenance sessions were identical to probe sessions. Sessions will remain in the same setting with the same or similar play-based activities for participants and peers to choose from, and no support or feedback from the instructor.

3.7 Reliability and Fidelity

IOA and procedural fidelity data should be collected at least 20% of probe and instructional sessions in each condition for each participant (Ledford & Gast, 2018). Thus far, within the probe condition, IOA and PF data were collected for 25% of Annabelle's sessions, 18% of Hannah's sessions, 33% of Debbie's sessions, and 40% of Dax's sessions. Within the instructional condition which was reached by two participants, Annabelle and Hannah, PF and IOA data were collected for 27% of Annabelle's sessions, and 14% of Hannah's sessions. Within the maintenance condition which was reached by Annabelle, PF and IOA data were collected for 100% of Annabelle's sessions, as only one session was conducted thus far.

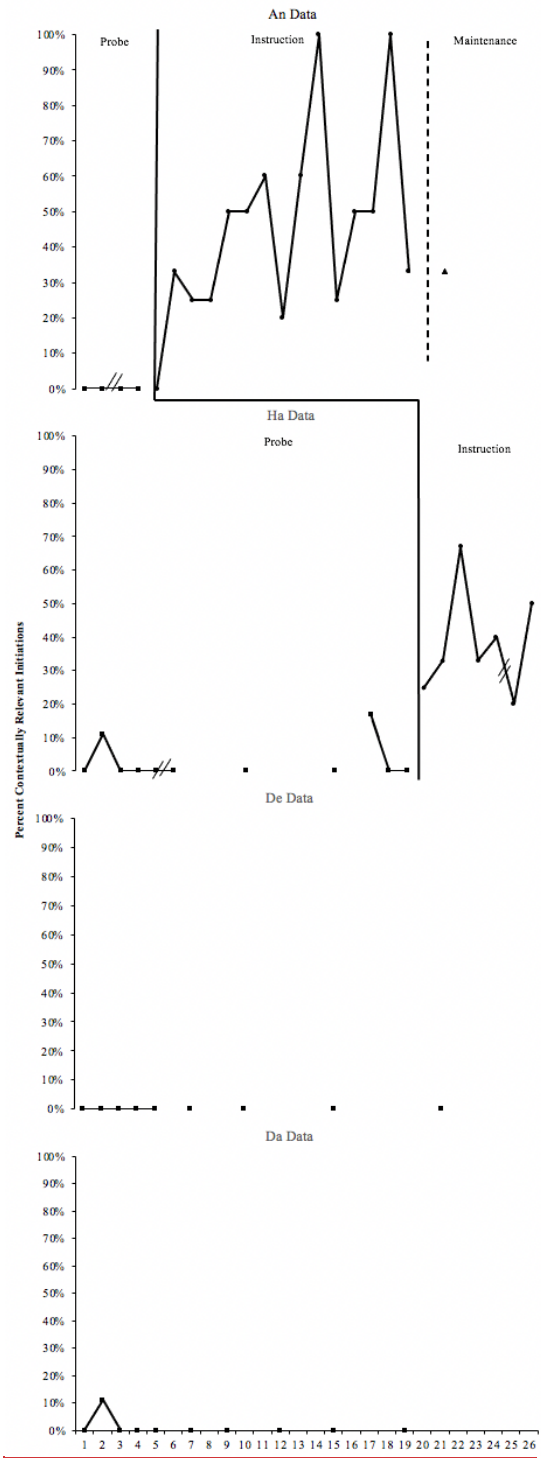
Two graduate students were trained to collect data on the dependent variable and study procedures. The instructor provided an in-depth explanation of the program, procedures, types, and definitions of possible responses. The classroom teacher and

graduate students practiced collecting data in the classroom using the definitions for the target behavior, as well as the procedural fidelity form. Acceptable levels of IOA and procedural fidelity for the purposes of this study were levels above 80% or higher for at least one observation sessions. If 80% was not reached, a discussion was held to provide clarification of where disagreements occurred. Reliability data for the dependent variable were calculated using the point-by-point method of agreement using time stamps. The formula is the number of agreements within 5 seconds divided by number of agreements plus disagreements multiplied by 100 (Ledford & Gast, 2018). The procedural fidelity data collector collected data on the following steps in probe and instructional sessions: (a) ensuring joint attention, (b) setting up the contextual situation (i.e., withholding, asking questions, engaging in silly situations), (c) waiting/providing the defined response interval, and (d) providing the corresponding consequence based on type of response. Within the instructional condition, data were collected on an additional step (e) providing at least one instance of aided language modeling. Procedural fidelity data were collected using the formula: number of instructor's behaviors occurred/number of instructor's behaviors planned multiplied by 100. Dates of each session and participant initials were also marked when recording PF and IOA data on data sheets and within the Countee app. PF and IOA data across participants and observers were consistently within acceptable limits throughout the course of this study. Procedural fidelity data for all participants remained at 100% across all conditions. IOA data remained at 100% across participants and conditions with the exception of Dax, whose mean score within the probe condition was 95% (86-100%), and Hannah, whose mean score within the instructional condition was 83% due to only having data collected for one instructional session.

CHAPTER 4. RESULTS

Figure 1 shows student responding for all participants. All data were visually inspected with consideration of level, trend, stability, overlap, consistency of effect, and immediacy of effect. Relatedly, because a time-lagged design was used, vertical analysis occurred. Vertical analysis refers to comparing data across pre-intervention conditions to detect potential covariation (Barton et al., 2018). At this time, results are based on performance within the first two tiers, as this study is ongoing.

Figure 1 Student Responding for All Participants



4.1 Probe

During the probe condition, across all participants, data were relatively stable across the first four consecutive sessions. Two participants, Annabelle and Debbie, displayed a zerocelerating trend in responding, with the data path consistently at 0% along the ordinate across the initial sessions. Two participants, Hannah and Dax, displayed similar patterns of responding, with the exception of 10% correct responding observed in Session 2 for both participants. With the exception of Annabelle, who was receiving the intervention, intermittent probe sessions continued for all participants with a similar pattern of responding observed across participants. It should be noted that Hannah displayed an increase from 0% to 20% when entering into her first of 3 consecutive probe sessions immediately before intervention. Her second and third probe sessions stabilized again at 0% before instruction began.

4.2 Aided Language Modeling (Instruction)

Intervention initially began with Annabelle. After introducing the intervention to Annabelle, a variable accelerating trend in a therapeutic direction was observed in the data path. Initially, there was 100% overlap between the last probe sessions and the first intervention session, but a gradual improvement in correct initiations following an environmental arrangement was observed over subsequent sessions, with 33% during the second instructional session. Her correct initiations following environmental arrangements continued to increase from baseline, as the following two sessions both reached 25% correct initiations. Her data continued to accelerate in a therapeutic direction during her fifth, sixth, and seventh instructional sessions where her performance increased to 50% in

the fifth and sixth sessions, and 60% in the seventh. The data from these sessions showed that Annabelle had met the criterion for instruction to begin in the next tier, as her scores showed at least 50% growth in the dependent variable over responding observed during the pre-intervention condition for three consecutive sessions. After Annabelle reached criterion, three consecutive probe sessions were conducted with the next participant, Hannah. After introducing the intervention to Hannah, a variable accelerating trend in a therapeutic direction was observed in the data path. An improvement in her correct initiations was reflected by the data immediately after intervention began, as her first session increased to 25% and the second session increased to 33% correct initiations. Her percentage of independent contextually relevant initiations continued to increase in the third session as she scored a 75%. Data taken after Thanksgiving break showed a lower score but began to accelerate again in a therapeutic direction after returning to school.

Variability within the data paths for both Annabelle and Hannah could be related to the number of trials presented within each session, as the number of trials varied between 3 (minimum) and 10.

4.3 Maintenance

Annabelle completed one session within the maintenance condition. The session showed a decrease from where data had been ranging previously, but continued to demonstrate a therapeutic effect of the intervention compared to data from her original probe condition.

CHAPTER 5. DISCUSSION

The purpose of this study was to extend the research of using ALM as an intervention with elementary aged students with extensive support and complex communication needs. The intervention was ALM, which included providing direct models on participants' AAC devices while simultaneously using oral speech in order to teach social communicative intents (i.e., requesting and commenting) while engaged in play-based activities with similarly-aged peers. At this time, the study is ongoing and, as such, presence or absence of a functional relation cannot be determined. Thus far, both participants that reached the instructional condition displayed improvements in correct initiations following environmental arrangements during play-based activities with peers. Neither participant required use of the planned modification that was made when designing the study. In a similar study that involved using aided language modeling during play-based activities (Drager et. al., 2006), results showed improvement in both participants and demonstrated that adult models helped result in symbol comprehension and production. Overall, current data within this study reflect similar findings from O'Neill et al. (2018) that ALM is an effective intervention across participants of varied ages and disabilities and could extend the research of using ALM as an intervention with elementary students with complex communication needs. As indicated, a functional relation cannot be evaluated but one basic demonstration of effect as well as improvements in a subsequent tier were present in the data; thus, discussed findings are correlation.

Anecdotally, I observed some additional effects throughout the study. First, Annabelle demonstrated anywhere from 1-3 spontaneous initiations within sessions toward the later part of her instructional condition. Spontaneous initiations were not in response to an environmental arrangement but included the targeted behavior of comments and

requests related to the activity. An example of one of her comments was using her AAC device to say “star” when using a star-shaped playdoh cutter while playing with playdoh to comment on what she was creating. Additionally, the same-aged peers in each dyad showed enjoyment and anticipation over the course of the study demonstrated through comments about being excited to come to the classroom to play for their session or asking when the next time was that they would be able to play with the participant. Same-aged peers also picked up on the verbal models of contextually appropriate language provided by the instructor and would use similar models throughout sessions and during their turns in activities. They did not imitate the aided language models on the participants’ AAC devices.

5.1 Implications for Practitioners

In considering all of the daily tasks that special education teachers complete, the intervention of ALM itself is an intervention that can be quickly implemented within a special education classroom where there are students that use AAC devices with reduced effort. It does not require a large number of extra materials to implement because it can be embedded across activities and across many different subjects of instruction. Additionally, ALM can be taught to other team members in a special education classroom and help them become familiar with student AAC devices, of which there may be multiple forms and software throughout the classroom (Kashinath et al., 2022).

There were also areas of difficulty that included scheduling sessions while ensuring sufficient coverage for the other students that were not participating in the study. Based on other factors within the school environment including standardized testing for peers used

in dyads, staff absences, and schedule changes due to school events or breaks, it was a challenge at times to ensure that other students in the classroom at the time of sessions had enough adult support to remain on schedule and attentive to their instructional tasks. It proved beneficial to have people outside of the classroom team trained to come in and collect PF and IOA data. This helped to ensure that only one adult, the instructor, was removed from the instruction and supervision that were occurring for other students in the classroom at the time sessions were conducted.

Unexpected or extensive absences of both participants and peers due to widespread illness throughout the school was another factor that impacted the ability to collect consecutive data points or stay within the recommended range for conducting probe sessions for some participants within this study.

5.2 Future Research

There are multiple ways in which procedures in this study could be evaluated or modified in future studies. Regarding participants, all were White, Non-Hispanic students that had both parents present in their home. In future studies, the demographics of participants included in this study can be expanded to include different ethnicities, races, and socioeconomic statuses, which would allow for more generalization of the results across a larger population. To evaluate generalization across different individuals and settings, future researchers could take pre- and post-intervention data to compare the presence of contextually relevant initiations to peers in addition to initiations to the instructor or implement the study in settings other than the participants' school

environment. Generalization data could also be collected across the study consistently or using intermittent probes to strengthen findings.

The implementation of ALM during the instructional condition could have included more systematic information such as the number and type of models implemented in each session. This information could help to determine what frequency and intensity of models has to be delivered before data reflect changes in participant responding.

Additionally, this study can be used to evaluate other social communicative intents that were not targeted in this study, such as greeting or asking questions to seek information.

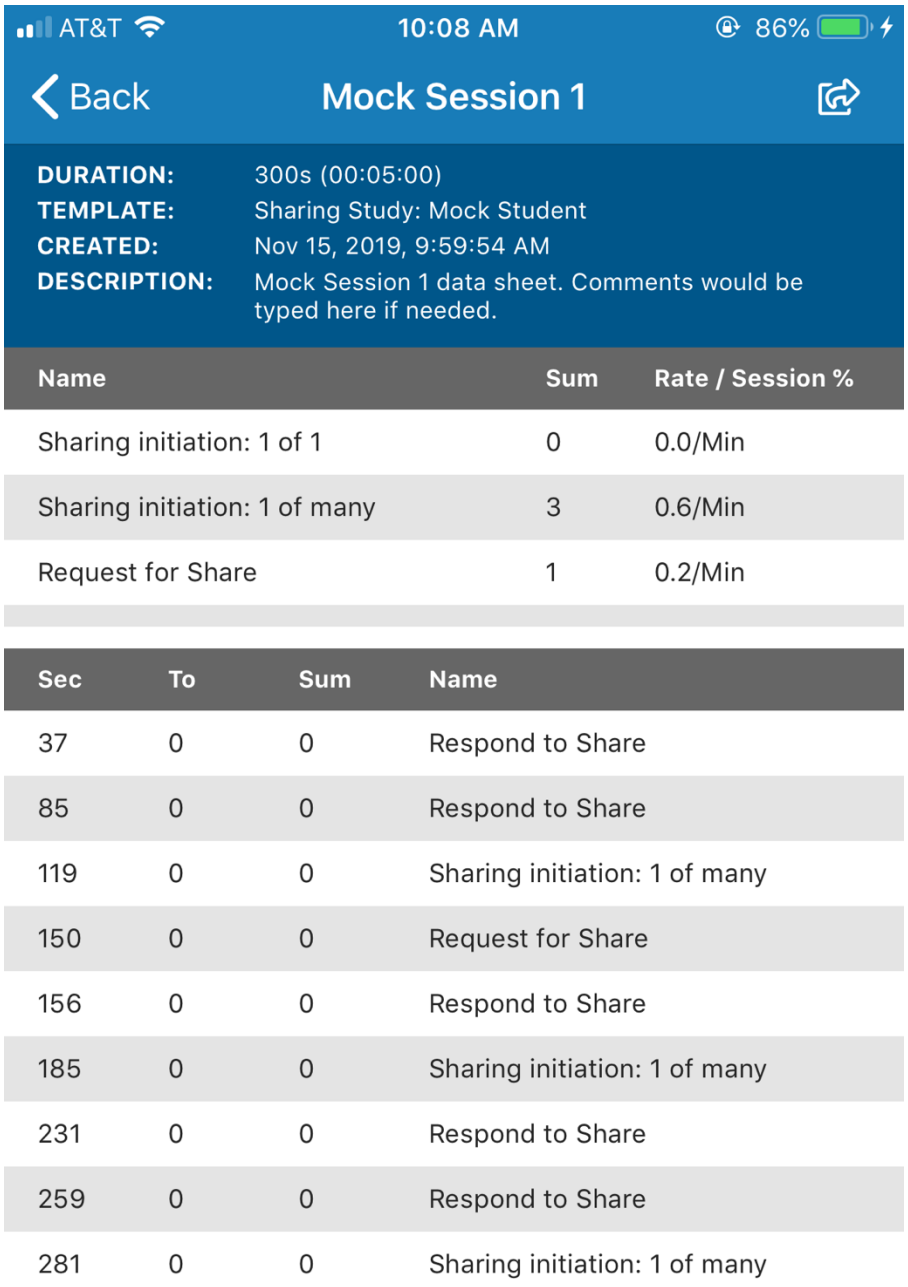
5.3 Limitations

Limitations of this study warrant attention. First, IOA and PF data were collected 18% of probe sessions for Hannah, instead of at least 20% of sessions, per contemporary methodological guidelines for single case studies (Ledford & Gast, 2018). This was due to a procedural error on the part of the instructor. Second, due to illness, more than 8 days elapsed between probe sessions for Debbie and Dax, and between the final instructional session and first maintenance session for Annabelle. Third, for instructional sessions 4, 8, and 11 of Annabelle's instructional condition, PF data on the instructor's implementation of ALM at least once per session was retrospectively confirmed, as that step was not included on the procedural fidelity data sheets until after PF data had begun being collected. Procedural fidelity on all other steps of the probe and instructional sequences (listed in the Reliability and Fidelity section) were collected consistently. Fourth, generalization data were not formally assessed, although opportunities for generalization to occur were present

throughout the study as participants had opportunities to engage in the free operant behavior of initiating communication with their same-aged peer in addition to the instructor during sessions. Lastly, the maintenance session for Annabelle took place later than originally planned in the procedures. This was due to a procedural error on the part of the instructor not initiating consecutive probe sessions for tier 2 and beginning instruction as soon as criteria in tier one 1 was met by Annabelle.

APPENDICES

APPENDIX 1. SAMPLE SCREENSHOT OF COUNTEE APP



Name	Sum	Rate / Session %
Sharing initiation: 1 of 1	0	0.0/Min
Sharing initiation: 1 of many	3	0.6/Min
Request for Share	1	0.2/Min

Sec	To	Sum	Name
37	0	0	Respond to Share
85	0	0	Respond to Share
119	0	0	Sharing initiation: 1 of many
150	0	0	Request for Share
156	0	0	Respond to Share
185	0	0	Sharing initiation: 1 of many
231	0	0	Respond to Share
259	0	0	Respond to Share
281	0	0	Sharing initiation: 1 of many

APPENDIX 2. PROBE SESSION PROCEDURAL FIDELITY SHEET

Probe Session Reliability Data Sheet

Student: Instructor: Kaitlyn Kousins Date: _____

Trial	Stimulus	Ensures Joint Attention	Withheld materials / asked question / engage in silly situation	Response Interval	Provides Correct Consequences
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
# observed / # planned					
% accuracy					

Ensures Joint Attention – The student is oriented to instructor

Response Interval – The instructor waits 5 seconds for student to initiate response and allows 15 seconds to student to complete the request.

Possible Student Responses	**Definition of Response**	**Teacher Consequence Following the Response**
Correct initiation	A participant using their device to independently respond to an environmental arrangement (request information, make a comment) within 5 s and completing the response within 15 s	Respond to the request or communicate with an age-appropriate response and any related action (e.g., giving an item).
Incorrect initiation	A participant using their device to initiate a response that is not contextually related to the environmental manipulation	Continue with activity
No response	Does not initiate any response on the AAC device within 5 s	Continue with activity

APPENDIX 3. INSTRUCTIONAL SESSION PROCEDURAL FIDELITY SHEET

Instructional Session Reliability Data Sheet

Student: Instructor: Kaitlyn Kousins Date: _____

Trial	Stimulus	Ensures Joint Attention	Withheld materials / asked question / engage in silly situation	Response Interval	Provides Correct Consequences	Was at least one instance of ALM provided? (circle)
1						Yes / No
2						
3						
4						
5						
6						
7						
8						
9						
10						
# observed / # planned						
% accuracy						

Ensures Joint Attention – The student is oriented to instructor
Response Interval – The instructor waits 5 seconds for student to initiate response and allows 15 seconds to student to complete the request.

Possible Student Responses	**Definition of Response**	**Teacher Consequence Following the Response**
Correct initiation	A participant using their device to independently respond to an environmental arrangement (request information, make a comment) within 5 s and completing the response within 15 s	Respond to the request or communicate with an age-appropriate response and any related action (e.g., giving an item).
Incorrect initiation	A participant using their device to initiate a response that is not contextually related to the environmental manipulation	Continue with activity
No response	Does not initiate any response on the AAC device within 5 s	Continue with activity

APPENDIX 3. PLANNED MODIFICATION PROCEDURAL FIDELITY SHEET

Planned Modification Instructional Reliability Data Sheet

Student: Instructor: Kaitlyn Kousins Date: _____

Trial	Stimulus	Ensures Joint Attention	Withheld materials / asked question / engage in silly situation	Response Interval	Provides Correct Consequences
1					
2					
3					
4					
5					
6					
7					
8					
9					
10					
# observed / # planned					
% accuracy					

Ensures Joint Attention – The student is oriented to instructor
Response Interval – The instructor waits 5 seconds for student to initiate response and allows 15 seconds to student to complete the request.

Possible Student Responses	**Definition of Response**	**Teacher Consequence Following the Response**
Correct initiation	A participant using their device to independently respond to an environmental arrangement (request information, make a comment) within 5 s and completing the response within 15 s	Respond to the request or communicate with an age-appropriate response and any related action (e.g., giving an item).
Incorrect initiation	A participant using their device to initiate a response that is not contextually related to the environmental manipulation	Directly model a contextually-appropriate response on the device and wait up to 5 s for the participant to begin communication and up to 15 s to complete the response
No response	Does not initiate any response on the AAC device within 5 s	Directly model a contextually-appropriate response on the device and wait up to 5 s for the participant to begin communication and up to 15 s to complete the response

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