SUPPORTING A SCHOOL TEAM IN PLANNING AND IMPLEMENTING AAC FOR A CHILD WITH INTELLECTUAL DISABILITY

BY

MELINDA R. SNODGRASS

DISSERTATION

Submitted in partial fulfillment of the requirements
for the degree of Doctor of Philosophy in Special Education
in the Graduate College of the
University of Illinois at Urbana-Champaign, 2016

Urbana, Illinois

Doctoral Committee:

Associate Professor Hedda Meadan-Kaplansky, Chair
Professor James W. Halle
Professor Jennifer C. Greene
Professor Joe Reichle

Abstract

Supporting a child who cannot use speech and also has a language disorder to learn augmentative and alternative communication (AAC) is often challenging for families and school teams. I provided one school-family team with supports package that consisted of a structured team meeting and one-on-one coaching. I examined the effectiveness of this supports package in facilitating (a) team functioning, (b) instructional competence in AAC instruction, and (c) the child's communication. The supports package was effective in improving team functioning and building instructional competence, which led to positive changes in the child's communication using AAC. However, the supports package was insufficient in supporting ongoing functioning and instructional competence that lead to the child's independent, autonomous communication via AAC. This suggests that the supports package is a useful first step in this process but that additional ongoing supports are needed.

Keywords: augmentative and alternative communication, team functioning, instruction, communicative competence, family-school partnerships.

Acknowledgements

Eli, your voice is powerful to me. Thank you for letting me listen.

Nina and Boris, Clair, Elsa, Lizzy, Jane, and Elaine, thank you. Thank you for all that you gave to this project, for letting me into your lives and for trusting me to share your story with others. You do amazing things every single day. I know. I have the video to prove it. There are no words for what you have given.

This project was a labor of love and I am deeply grateful for the immeasurable support of:

- Dr. Hedda Meadan, who has patiently, consistently, and kindly guided me in more ways than I can list, who carefully and thoughtfully guided and contributed to this work, and whose mentorship and friendship means more to me than is speakable.
- Dr. Jim Halle, who has given me the gift of his time, guidance, edits, and conversation since the first day we met and whose presence enriches my life and clarifies my voice.
- Dr. Jennifer Greene, whose teaching, feedback, and work has profoundly shaped my thinking, understanding, and goals in research and in life.
- Dr. Joe Reichle, who graciously took me on, an unknown, and gave of his time and expertise.
- Kayla Jordan, who poured more than was asked or required into her tireless work on this project; it is better because she was a part of it.
- Eve Zumwalt, Paige Smiles, Lauren De Vries, Ga Kyung Jeong, and Moon Chung, whose time and effort made this project possible.
- The many other faculty and colleagues who have supported me, taught me, included me, listened, reviewed, discussed, refined, and bettered my thinking and my work.

- Laura Thomson, who first taught me about AAC, who continues to work tirelessly to give voice to the voiceless in her work and beyond, and who has supported me without fail.
- My dear friends, who have faithfully checked in, sent messages, made food, stopped by, cared about my work.
- My extended family, who care for, encourage, sustain, and love me.
- My siblings, Drew, Matthew, Maria, and Allie, who love and support me without condition.
- My parents, Ralph and Alice, who unfailingly support me in every possible way, love me unconditionally, who first heard my voice, and who continue to listen.

All is grace. Thank you, dear friends.

Table of Contents

Chapter 1

Introduction

Team Functioning, Effective Instruction, and Social Validity in AAC Implementation

When I was a special education teacher, I worked with children who had pervasive support needs due to various health conditions. Most of my students received special education services under the categories of intellectual disability or multiple disabilities and most of them did not use oral speech. As a result, their families, the other members of their educational teams, and I were tasked with developing an augmentative and alternative communication (AAC) system for each student, creating a plan for teaching them to operate their respective systems, and designing a plan for simultaneously teaching them to use a language via AAC (usually English, sometimes Spanish) they may or may not have yet understood. As a result of their health conditions, most of my students had both a speech disorder and a language disorder.

This was no small task, but the speech-language pathologist (SLP) with whom I worked was well versed in AAC evaluation, design, and instruction. Under her guidance, we would devise a plan, implement that plan in my classroom, and usually, watch the child's communication skills grow. However, I observed a phenomenon that was surprising to my often linear mind: Just because we successfully taught a child to use language via AAC did not mean that all the members of that child's team bought into our plan (e.g., parents, occupational therapist, physical therapist, teacher for the visually impaired, etc.). Worse still, when multiple members of the team were not on board, over time, the effectiveness of our efforts eroded, as the child's communication with these people remained limited in spite of the success s/he was

experiencing with the more invested members of the team. To present it another way, I was observing:

$$Positive\ AAC\ outcomes\ \neq Buy\ in \neq Implementation\ \neq Successful\ AAC$$

In other instances, we had buy-in from everyone on the team before implementing a plan, but we ran into different roadblocks in helping students experience success with AAC. Our plans sometimes failed to produce desirable results, but, given their buy-in to the plan, the team persisted in its implementation. Essentially:

$$Buy\ in + Mediocre\ or\ Poor\ AAC\ Outcomes = Implementation\ \neq Successful\ AAC$$

These experiences were supremely frustrating. Communication is essential to the human experience, and I was watching our failure to work together effectively and/or to identify effective instructional practices obstruct the child's access to that most fundamental of human rights, the right to affect the situations of their existence through communication (Brady et al., 2016; National Joint Committee for the Communication Needs of Persons With Severe Disabilities [NJC], 1992).

My experiences were not unique. Numerous research efforts, those addressing AAC and those examining any number of other human endeavors, have recounted the complex challenges that come with trying to coordinate the unique philosophies, knowledge, skills, and experiences of the members a team around a common purpose (Beukelman & Mirenda, 2013; Michan & Rodger, 2000; Soto & Zangari, 2009; Tuckman & Jensen, 1977). Thus, I have devoted my research to examining how educational teams can more effectively support individuals with intellectual disability who use (or need to use) AAC. The purpose of the work presented here is to identify and test possible supports for school teams to foster successful AAC outcomes for

children with intellectual disability who require its use. It is an effort to transform that formula into:

$$Buy\ in + Positive\ AAC\ outcomes = Implementation = Successful\ AAC$$

Informed by my review of the literature presented in the next chapter, I have come to understand this problem as the complex interaction of the extent to which (a) a team functions around the task of providing AAC services and supports, (b) team members develop instructional competence around AAC, (c) these efforts are effective in supporting the individual using AAC, and (d) the methods to support these efforts are perceived as socially valid by all team members. These factors intersect across the multiple complex contexts in which the individuals who use AAC and their team members interact (Beukelman & Mirenda, 2013; Brady et al., 2016; NJC, 1992).

Team functioning refers to the extent to which all members of the team effectively and efficiently work both together and individually toward the collective goals of the team while promoting positive experiences for its members and positive outcomes for the individual who is using AAC. A team that is functioning well must also be providing instruction to the individual using AAC that is effective in improving that person's communication skills (i.e., effective instruction).

Instructional competence refers to the extent to which each team member can apply evidence-based instructional strategies for supporting AAC learning with sufficient fidelity across all interactions with the individual using AAC. Social validity refers to the extent to which the members of a team perceive the goals, procedures, and outcomes of efforts to support their functioning as a team, their AAC instruction, and the individual's AAC development to be appropriate and important (Wolf, 1978). If there are ways to support both team functioning and

instructional competence around AAC in a manner that is socially valid and that is sufficiently flexible to be applied across a wide variety of contexts, such supports may facilitate efforts to improve coordinated, person- and family-centered, collaborative AAC services that address an individual's current and future communication needs. This is necessary to ensure that individuals who use AAC are able to communicate with others (Bailey, Parette, Stoner, Angell, & Carroll, 2006; Beukelman & Mirenda, 2013; Goldbart & Marshall, 2006; Johnson, Inglebret, Jones, & Ray, 2006; Saito & Turnbull, 2007).

The Need for Integrated Supports

An educational team must function well to produce desired outcomes. To date, limited work has been done in providing educational teams with supports for doing this around implementing AAC for children with intellectual disability and complex communication needs (CCN; Light & McNaughton, 2015). I focus this work on the team's effort to implement AAC with the child, although they must also function around activities of communication evaluation and AAC system selection and design prior to implementing AAC. The team must function around three activities of AAC implementation: (a) planning, (b) instructing, and (c) maintaining (i.e., the ongoing cycle of planning, implementing, and updating the AAC system as they child develops skills).

Researchers have stated that activities that support team functioning and planning for implementation include, but are not limited to, articulating a clear plan, establishing consensus around that plan, and clearly defining team members' roles in implementing that plan (King-Sears, Janney, & Snell, 2015). Thus, supports that build a team's functioning capacity also support planning for implementation and vice versa. Researchers have examined the challenges AAC teams face when attempting to do this work (e.g., Bailey, Parette, et al., 2006; De Bortoli,

Arthur-Kelly, Mathisen, & Balandin, 2014) and have developed guidelines for incorporating theories and principles of team functioning into team practices (e.g., Robinson & Solomon-Rice, 2009), but very few interventions specifically addressing AAC team functioning in schools have been systematically evaluated (Light & McNaughton, 2015; see also Hunt, Soto, Maier, Müller, & Goetz, 2002).

More research efforts have been devoted to identifying supports for providing instruction to children learning AAC (Kent-Walsh, Murza, Malani, & Binger, 2015; Light & McNaughton, 2015). From this work, two themes emerge. First, the members of a child's team responsible for providing instruction in AAC benefit from receiving coaching that is connected to the larger plan for supporting the child's communicative competence and provided during their interactions with the child (Kent-Walsh et al., 2015). Second, as is true for instruction in any skill, the team members must implement instructional strategies that have been demonstrated to be effective in teaching the target skill (i.e., evidence-based practices; Cook & Odom, 2013; Fixsen, Naoom, Blase, Friedman, & Wallace, 2005). Fortunately, researchers have developed many evidence-based practices for teaching various AAC skills to individuals with intellectual disability (Beukelman & Mirenda, 2013; Calculator & Black, 2009; Snell, Chen, & Hoover, 2006).

To identify and integrate supports for both team functioning and AAC implementation (i.e., planning and instruction) is a daunting and understudied task, but identifying such integrated supports is not, in and of itself, sufficient for supporting the development of communicative competence in children with intellectual disability. The goals, procedures, and outcomes of the supports provided must also be acceptable to the people who use them or they are unlikely to ever be translated from researchers' direct efforts into the practices of educational teams (Cook & Cook, 2011; Wolf, 1978).

The Problem and Significance

To date, little work has been done to integrate supports for team functioning and supports for implementing AAC into a package that is flexible and socially valid for educational teams who are supporting individuals with intellectual disability who require AAC. In the absence of such supports, school teams struggle to provide AAC services that successfully support children's AAC use and develop their communicative competence (Barker, Akaba, Brady, & Thiemann-Bourque, 2013; Simpson et al., 1998). I have personally experienced this struggle; its demoralizing effects on parents, other members of the team, and myself; and the frustrating lack of progress in AAC my students made. These experiences inform my research.

In the United States, schools services are the primary place where children with intellectual disability and CCN receive AAC services (ASHA, 2004). A very small percentage of the total student population in the U.S. requires these services (ASHA, 2004; Beukelman & Mirenda, 2013). Although low in prevalence, AAC services are essential to protecting the very basic human right of affecting one's own circumstance through communication (NJC, 1992). Thus, identifying supports packages that address both team functioning and implementation of AAC for school teams is a worthy and needed task.

Purpose and Theory of Change for the Current Study

The purpose of this study was to engage with an educational team for a child with intellectual disability who used AAC to examine the effectiveness of a supports package developed from an extensive review of the literature by addressing the following research question:

> In what ways and to what extent is a supports package for a child's educational team effective in supporting (a) the experience and functioning of the team around AAC, (b) competence in AAC instruction, and (c) the child's communication skills?

The participants in this study (i.e., educational team members for a child with intellectual disability) received two interventions. Intervention 1 was a structured team meeting using a scripted agenda that was designed to support team functioning and planning for AAC instruction. Intervention 2 was one-on-one coaching for individual team members in the application of instructional strategies with the child. Using a mix of case study and single-case design research methodologies, I examined the effectiveness of this supports package, addressing measures of observed behavior change in the adult team members and the child, measures of perceived effects, and measures of the social validity of the supports package. In Figure 1, I outline the theory of change that informed the development of this supports package. Assuming the package is socially valid, I predicted that Intervention 1 (i.e., Team Forming Meeting) would improve team functioning and, indirectly, improve the team members' instruction with the child. I predicted that Intervention 2 (i.e., one-on-one coaching in instructional strategies) would improve the team members' instruction and, indirectly, improve team functioning. If both of these improvements were realized, I predicted that this would improve the child's AAC performance. This, in turn, would improve the teaming experience and perception of the members' roles in the child's life. If that occurred, I predicted that this would also indirectly improve their team functioning and instruction, as witnessing the child's success with AAC is likely to motivate their efforts as members of the team and as the child's AAC instructor.

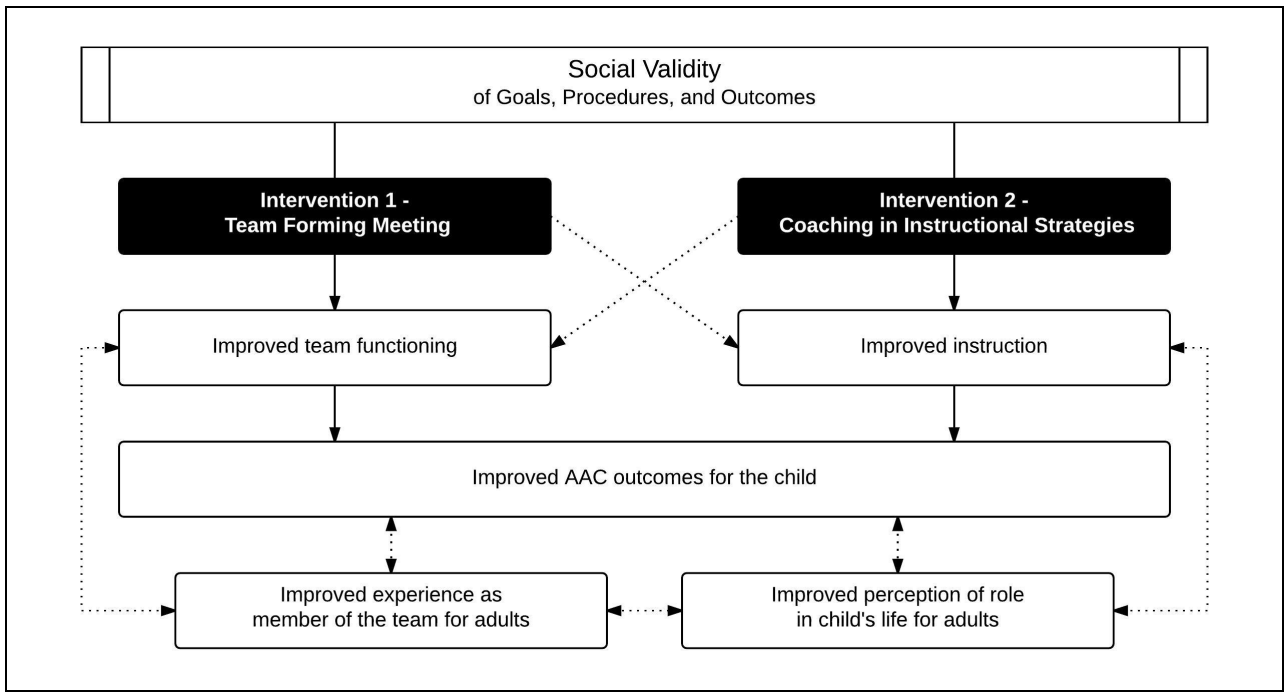


Figure 1. The theory of change for the study. The interventions provided as part of the supports package in the study are in black boxes. Solid arrows indicate predicted direct effects. Dotted arrows indicate predicted indirect effects.

In this study, I predicted that both interventions would affect outcomes across team functioning and instruction (see dotted lines in Figure 1). In addition, the outcomes the supports package was intended to produce were related to both the perceptions of the participants (i.e., subjective) and the actual performance of the participants (i.e., objective). Therefore, I designed a mixed methods study to evaluate the effectiveness of this supports package. In Chapter 2, I review the literature that informed the development of this study. In Chapter 3, I provide details of both methodologies used in this study (i.e., case study, single-case design) and my plan for mixing these methodologies to answer the research question. In Chapter 4, I present the results of the study, and in Chapter 5, I discuss the findings, limitations, and implications of this work.

Chapter 2

Literature Review

An Introduction to AAC for Individuals With Intellectual Disability in U.S. Schools

In the United States, the Individuals with Disabilities Education Improvement Act (IDEA, 2004) mandates the provision of education and related services to children with disabilities, beginning at birth and ending on the individual's twenty-second birthday. The services provided under IDEA extend beyond academic support to include supports in other domains, such as physical functioning (e.g., occupational and physical therapy), communication (e.g., speech-language therapy), vision, hearing, and health needs (e.g., nursing, social work) (IDEA, 2004). As such, education services function as a primary source of support across multiple domains of human functioning for individuals with disabilities for the first two decades of their lives (ASHA, 2004; Burns et al., 1995; Ruble, Heflinger, Renfrew, & Saunders, 2005).

Although IDEA applies to individuals with any disability, in this study, I am considering the experiences particular to children with a disability that affects cognition. Here, I briefly describe some common current terminology and define the terms I use throughout, as identifying the individuals whose experiences are relevant to the work at hand do not necessarily fall along diagnostic or educational category lines, and because the use of terminology and language is widely discussed but little consensus has developed between groups of professionals, individuals with disabilities, and the public (Degeneffe & Terciano, 2011).

The term *developmental disabilities* is used to encompass a range of "severe chronic disabilities that can be cognitive or physical or both" that appear before the age of 22, and are likely to be lifelong (AAIDD, n.d.). The Centers for Disease Control and Prevention (2015)

define developmental disabilities as "a group of conditions due to an impairment in physical, learning, language, or behavior areas" (n. p.). This term may be applied when an individual's disability impacts only their physical development, only their cognitive development, or when an individual has disabilities that encompass both physical and cognitive development (AAIDD, n.d.). In contrast, the term *intellectual disability* was adopted to replace the term *mental retardation* and is a specific diagnosis, defined in the *Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders* (DSM-V; APA, 2013), that "encompasses the 'cognitive' part of this definition" of developmental disabilities (AAIDD, n.d.). Intellectual disability is characterized by "significant limitation both in intellectual functioning and in adaptive behavior as expressed in conceptual, social, and practical adaptive skills" that originates before the age of 18 (Schalock et al., 2012, p. 1). An individual with intellectual disability may never receive a formal diagnosis and may qualify for educational services through IDEA under a variety of educational categories (e.g., *multiple disabilities, other health impairment*), as variations in the use of diagnoses and education labels are common. In this study, I examined the experience of individuals who require supports related to cognitive functioning and use the term *intellectual disability* to refer broadly to these individuals regardless of their formal diagnoses or etiologies and including individuals who may need supports in additional areas of functioning.

Many individuals with intellectual disability have complex communication needs (CCN; Beukelman & Mirenda, 2013; Schalock et al., 2012; Snell et al., 2010). The term *complex communication needs* is also used in a variety of ways, but for the present purpose, I use this term to refer to the presence of a communication disorder that involves both (a) the cognitive processes of using and understanding language, and (b) the physical processes of producing speech. I apply this term to describe the needs of individuals who do not naturally develop

symbolic language (i.e., use words, either spoken or represented in another form, such as pictures; Wetherby, Reichle, & Pierce, 1998) and, therefore, require supports to develop the skills necessary for communicating with other people, including the use of augmentative and alternative communication (AAC; Beukelman & Mirenda, 2013). AAC is broadly defined as "all forms of communication (other than oral speech) that are used to express thoughts, needs, wants, and ideas" (ASHA, n.d.) and includes unaided communication systems, like sign language, or aided communication systems, like computerized systems that generate speech or picture-word cards that can be handed to a communication partner.

The National Joint Committee for the Communication Needs of Persons with Severe Disabilities (NJC) asserted in their Communication Bill of Rights, most recently updated in 2016 (Brady et al., 2016), that "all persons, regardless of the extent or severity of their disabilities, have a basic right to affect, through communication, the conditions of their own existence" (NJC, 1992, n. p.). In asserting these rights, the NJC identified that all individuals have the right to the supports they need to communicate, regardless of the extent to which others perceive their disabilities as prohibitive. In addition, they identified the critical role that an interdisciplinary team of supporters plays in ensuring that all individuals have access to the supports they need to realize these rights, stating:

> Communication intervention must involve significant people and significant contexts across multiple environments. The delivery of intervention services of this scope requires the collaboration and competence of families and of professionals and paraprofessionals from many disciplines. (NJC, 1992; http://www.asha.org/policy/GL1992-00201.htm)

And so, as the primary source for interdisciplinary support services for children in the U.S., the educational system has a responsibility to develop interdisciplinary teaming practices that fully include families and culminate in the development of AAC systems and language learning that empower children with intellectual disability and CCN to have their own voice in

their individual lives. To that end, professional organizations have integrated competency in AAC into their professional standards, including the American Speech-language Hearing Association (ASHA), which has developed a specific set of standards for knowledge and skills necessary for SLPs to deliver AAC services (http://www.asha.org/policy/KS2002-00067/), and the Council for Exceptional Children (CEC), which includes AAC competency in their Initial and Advanced Special Educator Preparation Standards (https://www.cec.sped.org/Standards/Special-Educator-Professional-Preparation/CEC-Initial-and-Advanced-Preparation-Standards).

The challenge before the education field now is to foster the widespread implementation of evidence-based and effective practices that produce the longitudinal communication outcomes that remain largely elusive for individuals with intellectual disability who use AAC. In this study, I attempt to address how interdisciplinary school teams (including parents) function to provide evidence-based and effective AAC supports and instruction to individuals with intellectual disability and CCN.

Purpose

The purpose of this literature review is to articulate the work that has been done in understanding three interdependent aspects of this complex work: (a) supporting an educational team's functioning, (b) developing adults' instructional competence in AAC, and (c) facilitating children's AAC skill development through evidence-based instruction and support. Before I review the literature related to these three dimensions, I describe individuals with intellectual disability who use AAC and the educational teams that support them. Then, I establish that school services play a primary role in the acquisition and initial learning of AAC for children with intellectual disability and CCN. Finally, I review evidence demonstrating that individuals

with intellectual disability who use AAC overwhelmingly experience poor long-term outcomes across multiple domains of human functioning. Given these poor outcomes and the important role school services play in counteracting these, I then turn to the purpose of identifying efficacious practices in (a) supporting an educational team's functioning, (b) supporting adults' instructional competence by providing parent coaching and embedded professional development to support instructional skill development, and (c) efficacious AAC instructional strategies for individuals with intellectual disability and CCN. I close with a brief discussion about the next steps researchers might take to address these needs and how this study contributes to these efforts.

The Population of Interest

For this study, I was interested in the experiences of individuals with intellectual disability and CCN who use AAC and the educational teams that support them. I describe these two populations here.

Individuals with intellectual disability who use AAC. For the purposes of this literature review, individuals with intellectual disability and CCN who use AAC include any individual who requires supports related to cognitive functioning and who have CCN, requiring support for both the cognitive and physical processes of using and understanding language through augmented or alternative forms of communication.

Prevalence. Because of the variety of diagnoses and educational categories under which individuals with intellectual disability can be identified, it is difficult to accurately estimate the number of individuals who have intellectual disability. In the most recent annual report to Congress about the implementation of IDEA, 7.3% of the students ages 6 through 21 who received special education services in the U.S. were receiving those services under the category

of intellectual disability (U.S. Department of Education, 2014). Individuals receiving services under other educational categories may also have intellectual disability. For example, 7.6% of students were receiving services under the category of autism, 2.2% under multiple disabilities, 2.1% under developmental delay, 0.4% under traumatic brain injury, and 0.03% under deaf-blindness (U.S. Department of Education, 2014). As it is likely that individuals in each of these categories meets the definition for intellectual disability used in this work, an accurate number is not readily available. In addition, the report does not include data on the prevalence of AAC use.

Identifying the prevalence of CCN in individuals with intellectual disability is also a difficult task. In a study published in 2012, Towles-Reeves and colleagues asked U.S. teachers to report about their students (grades 3 through 12) with the most significant disabilities, across various disability categories including intellectual disability. They found that approximately 28% of the sample of 49,669 students with severe disabilities who participated in state alternate assessments did not have symbolic language (i.e., student did not use "verbal or written words, signs, Braille, or language-based augmentative systems to request, initiate, and respond to questions, describe things or events, and express"; p. 20). Although there are many limitations to using these results to identify prevalence, this is one estimate of the percentage of individuals with intellectual disability and CCN.

Given the difficulty in ascertaining the prevalence of intellectual disability and the prevalence of concomitant CCN, an estimate of the prevalence of the use of AAC by individuals with intellectual disability and CCN is even more elusive. We know, based on the results of multiple surveys conducted in the U.S. and abroad, that students with intellectual disability make up a majority of the school-aged individuals who require AAC (Beukelman & Mirenda, 2013). However, the number of individuals with intellectual disability who require AAC is less clear.

One may presume that the 28% of individuals with severe disabilities in the Towles-Reeves et al. (2012) study used nonsymbolic communication may require AAC to develop symbolic communication skills, but these researchers reported that only 16% of their sample used AAC. They could not determine how many of the students who were reported to use AAC were also represented in the group of presymbolic communicators (i.e., did not yet use AAC functionally) or how many of the student who do not use AAC (i.e., 74% of their sample) needed AAC (i.e., did not use speech). In 2011-2012, the National Core Indicators Adult Consumer Survey was administered in person to 12,041 U.S. adults with intellectual and developmental disabilities, some of whom required a proxy to assist with responding. Twenty-four percent of the respondents reported using nonverbal communication as their primary means of expression (National Core Indicators, 2014). While this study sampled an adult population, this number is similar to the 28% of respondents who relied on nonsymbolic communication in the Towles-Reeves et al. (2012) study. Thus, perhaps the best estimate is that approximately 25% of individuals with intellectual disability do not naturally develop speech and require AAC to communicate symbolically. Regardless of the prevalence of those in need of such supports, every individual has the right to the supports necessary to communicate (NJC, 1992).

Differences from others who use AAC. Individuals with intellectual disability who require AAC to support their complex communication needs pose a unique challenge to the educational teams that support them: they do not develop language in the same way as other individuals who use AAC may (Beukelman & Mirenda, 2013; Binger & Light, 2008). That is, some individuals who use AAC require AAC because of a speech disorder, defined as "an impairment of the articulation of speech sounds, fluency and/or voice" (ASHA, 1993).

Individuals with intellectual disability and CCN (as I have defined these terms for the purposes here) who use AAC, however, have both a speech disorder and a language disorder, defined as:

> impaired comprehension and/or use of spoken, written and/or other symbol systems. The disorder may involve (1) the form of language (phonology, morphology, syntax), (2) the content of language (semantics), and/or (3) the function of language in communication (pragmatics) in any combination. (ASHA, 1993, p. 1)

Thus, some individuals with intellectual disability and many individuals with other developmental disabilities, such as cerebral palsy, may develop language normally, composing complete, grammatically correct, vocabulary-rich messages in their minds that they are unable to express through speech. When AAC is required to support an individual with a speech disorder alone, the task of the educational team is to acquire an AAC system that allows the individual to express their messages, teach the individual to use that system, and provide related supports (Beukelman & Mirenda, 2013). The role of the educational team expands significantly when the individual also requires support for a language disorder, as the team must now also support the development of language (Beukelman & Mirenda, 2013).

Longitudinal outcomes with AAC. The long-term outcomes for individuals with intellectual disability and CCN who use AAC are often disappointing (Light & McNaughton, 2015). As previously mentioned, in a recent survey of 12,041 adults with intellectual and developmental disabilities across the United States (administered in person to all participants, some of whom required a proxy to assist with responding), nearly a quarter (24%) of those surveyed did not use verbal communication (National Core Indicators, 2014). Only 10% of the individuals who communicated nonverbally reported using formal AAC systems (e.g., computerized voice output communication device, sign language, finger spelling), and 83% reported relying solely on gestures and/or body language to communicate with others; the remaining 7% of individuals who communicated nonverbally reported relying on “other” forms

of communication. The individuals who relied on gestures and/or body language were significantly more likely to be unemployed, feel unsafe in their community, and experience violations of their rights (e.g., others reading their mail without their permission). They were also significantly less likely to report having friends or a significant other, participating in community activities, or having input into life choices (e.g., where and with whom they live).

Light and McNaughton (2015) outlined other troubling trends, identified through various research efforts, in the longitudinal outcomes for individuals who use AAC: (a) students are often denied access to the general education curriculum and settings; (b) up to 90% of these individuals leave the education system without functional literacy skills; (c) less than 5% of these individuals are employed, even part-time, in adulthood; (d) approximately 45% of adults in this population report being victims of abuse; (e) a majority of these individuals do not have access to appropriate AAC when receiving services in a hospital, resulting in an increased risk for poor health outcomes; (f) up to 91% of adults with severe intellectual or developmental disabilities do not have access to AAC; and (g) up to 77% of these individuals do not participate in any community activities as a result of communication difficulties. Given these dismal outcomes, there is a clear need for continued efforts to provide services that better meet the needs of individuals with intellectual disability and CCN who use AAC and their families, friends, and other members of their social networks (Light & McNaughton, 2015).

Educational teams. Because the U.S. education system plays such a crucial roll in the provision of services for individuals with intellectual disability, for this study, I was interested in the adults who comprise the educational team for an individual with intellectual disability who uses AAC.

Members of an educational team. The IDEA (2004) states that an educational team for a

child over the age of three years must include the parent(s)/guardian(s), a general education teacher, a special education teacher, a representative of the local educational agency, the child, and any other people the parents or the school invite, including related service providers (Part B, Sec. 614(d)(1)(B)). The Regulations for IDEA provided by the U.S. Department of Education allow for any other person with knowledge or expertise relevant to the individual with a disability to be included in the educational team, stating, "the determination of the knowledge or special expertise of any individual . . . must be made by the party (parents or public agency) who invited the individual to be a member of the IEP Team" (IDEIA Regulations, 2006, Sec. 300.321(c)). Thus, anyone can be included on a child's education team at the request of the parent or the school as long as they provide an explanation to the rest of the team, and the composition of educational teams can vary widely.

For children with intellectual disability and CCN, a speech-language pathologist (SLP) is most likely a member of the educational team, as the presence of CCN qualifies the child for speech-language therapy and the SLP is likely the team member responsible for coordinating AAC services (Balandin & Iacono, 1998; Beukelman & Mirenda, 2013). Other team members will vary based on the child's needs (e.g., physical disabilities warrant an invitation to a physical therapist) and preferences of the family (e.g., parents invite their nanny to participate).

The process of supporting AAC will involve all members of the educational team, but each team member has a unique role and relationship with the individual who uses AAC; as a result, each team member also has various responsibilities within the individual's support system (Beukelman & Mirenda, 2013). For example, the individual's SLP will have different roles, responsibilities, and relationships with the individual who uses AAC than the individual's school nurse. In addition, a school nurse who provides consultation to other team members about

managing health needs in the school will have much less direct contact with the child and, most likely, fewer responsibilities in supporting AAC. Beukelman and Mirenda used the term *AAC Facilitators* to refer to "family members, friends, professionals, and frequent communication partners who, in various ways, assume some responsibility for keeping the AAC system current and operational and/or for supporting the person with CCN to use it effectively" (Beukelman & Mirenda, 2013, p. 102). I adopt this term to differentiate members of the team who have clear and consistent interaction with the child and direct responsibility for implementing the supports necessary for the child to successfully develop AAC skills from the other members of the team.

Family involvement. Given the relative permanence of most parents and family members in the lives of individuals with intellectual disability and CCN, the importance of their full and respected membership on the educational team cannot be overstated. In addition to the exhortations in leading AAC textbooks for professionals to do everything in their power to facilitate family involvement (Beukelman & Mirenda, 2013; Glennon & DeCoste, 1997; Reichle, York, & Sigafoos, 1991; Soto & Zangari, 2009), multiple researchers have identified the critical role that families play in their child's successful acquisition of AAC skills and long-term use of AAC. The extent to which parents are engaged in using AAC with their children and have high expectations for success is positively associated with communication outcomes (Goldbart & Marshall, 2006; Johnson et al., 2006; Parette, Chuang, & Huer, 2004; Simpson et al., 1998). In contrast, when parents feel overwhelmed, isolated, stressed, or frustrated by the time or skills required to support their child's AAC system (Goldbart & Marshall, 2006), when they question the accuracy of their child's messages delivered via AAC or feel that the presence of an AAC system creates a lack of intimacy with their child (McCord & Soto, 2004), or when families do not have the support of their extended family (Johnson et al., 2006), the efforts of the educational

team to successfully support AAC are slowed or thwarted completely. That is, the child may only use AAC at school or with specific people, may abandon the AAC system and resort to using behaviors and other nonsymbolic forms of communication, or may abandon one AAC system and begin with a new system (Goldbart & Marshall, 2006; Johnson et al., 2006). Educational teams report the most success in supporting AAC when they engage in family-centered practices that support intervention at school and provide supports to the parents, siblings, and extended family of the child (Bailey, Stoner, Parette, & Angell, 2006; De Bortoli et al., 2014; Goldbart & Marshall, 2006; Lund & Light, 2007; McCord & Soto, 2004; Saito & Turnbull, 2007). When parents are dissatisfied with AAC services, when the professionals on the team fail to communicate sufficiently and/or effectively with the family, or when the family's voice is disregarded, efforts to support AAC often fail to produce the long-term effects desired (Bailey, Stoner, et al., 2006; Baxter, Enderby, Evans, & Judge, 2012; De Bortoli et al., 2014; Goldbart & Marshall, 2006; Parette, Brotherson, & Huer, 2000).

Clearly, efforts by an educational team must mesh with the needs, values, and desires of the child's family and the family must receive the support they need to successfully integrate AAC into their child's and family's life. Given the family's relative permanence in a child's life and the critical role they play in the child's success with AAC and many other skills, a power-shared partnership between the professionals and family members that make up the team must be developed (Turnbull, Turnbull, Erwin, Soodak, & Shogren, 2015). Power-shared partnerships exist when a team shares "their talents, time, and resources so that the whole is greater than the sum of the parts. Greater power exists because everyone is working together toward mutual goals; individual energy becomes group synergy" (Turnbull et al., 2015, p. 175). Unfortunately, much of what is reported about family-school partnerships to date reflects "power-over"

relationship in which professionals maintain power over the team's decisions (Turnbull et al., 2015, p. 175). Thus, continued efforts to create power-shared partnerships within AAC teams are needed.

Educational team's role in AAC. The educational team is widely regarded as critical to an individual's success with AAC (Beukelman & Mirenda, 2013). In their *Guidelines for Meeting the Communication Needs of Persons With Severe Disabilities,* the NJC stated,

> Communication intervention must involve significant people and significant contexts across multiple environments. The delivery of intervention services of this scope requires the collaboration and competence of families and of professionals and paraprofessionals from many disciplines. The ideal interdisciplinary delivery model requires that participants share a common perspective on communicative behavior. . . .
>
> An interdisciplinary model also reflects an awareness that interactive contexts that are salient and productive for persons with severe disabilities involve family members and professionals and paraprofessionals from many disciplines. A master intervention program is best formulated and implemented by an interdisciplinary team and involves all of the contexts controlled and managed by individual members of that team. Depending on an individual's age and disability, the exact composition of the interdisciplinary team will vary. However, the team must include a speech-language pathologist and family member or guardian. Communication teaching takes place within the context of all life activities.
>
> Clearly, each member of the interdisciplinary team, including family members, must be recognized as having specific and crucial contributions to make to the design of the communication intervention program. (NJC, 1992, n. p.)

Leading AAC textbooks also espouse the critical value of approaching AAC services as a team and identify the many players that contribute to success (Beukelman & Mirenda, 2013; Glennon & DeCoste, 1997; Reichle, York, & Sigafoos, 1991; Soto & Zangari, 2009), and a collaborative, team approach to providing AAC services and supporting AAC in an individual's life is widely considered best practice (Calculator & Black, 2009).

A team of professionals assembled to provide AAC services typically engages in three basic stages, outlined by Beukelman and Mirenda (2013): (a) evaluation, (b) AAC system design, and (c) implementation. First, the team evaluates the individual's motor, cognitive/ linguistic, literacy, and sensory/perceptual skills across the varying environments in which the

individual functions. Then, the team designs an AAC system to best meet the child's needs, selecting both the system to be used (e.g., picture exchange book, computerized voice output device) and the vocabulary to be included in that system. Finally, the team implements AAC with the child, planning for its integration into the child's life, implementing instruction to teach the child to use the AAC system, and engaging in ongoing maintenance activities, such as updating the software for the device or replacing picture symbols, and vocabulary management activities, such as adding new words to the system. At each stage, the process and outcomes are influenced by the team's functioning, or the extent to which all members of the team effectively and efficiently work together toward the collective goals of the team and produce outcomes associated with positive experiences for the team members and positive communication and related skill development for the individual who is using AAC. These stages are represented in Figure 2. For this study, I am interested in the team's planning and instructional activities during the implementation stage of providing AAC services to a child who is not yet using the AAC system for functional communication.

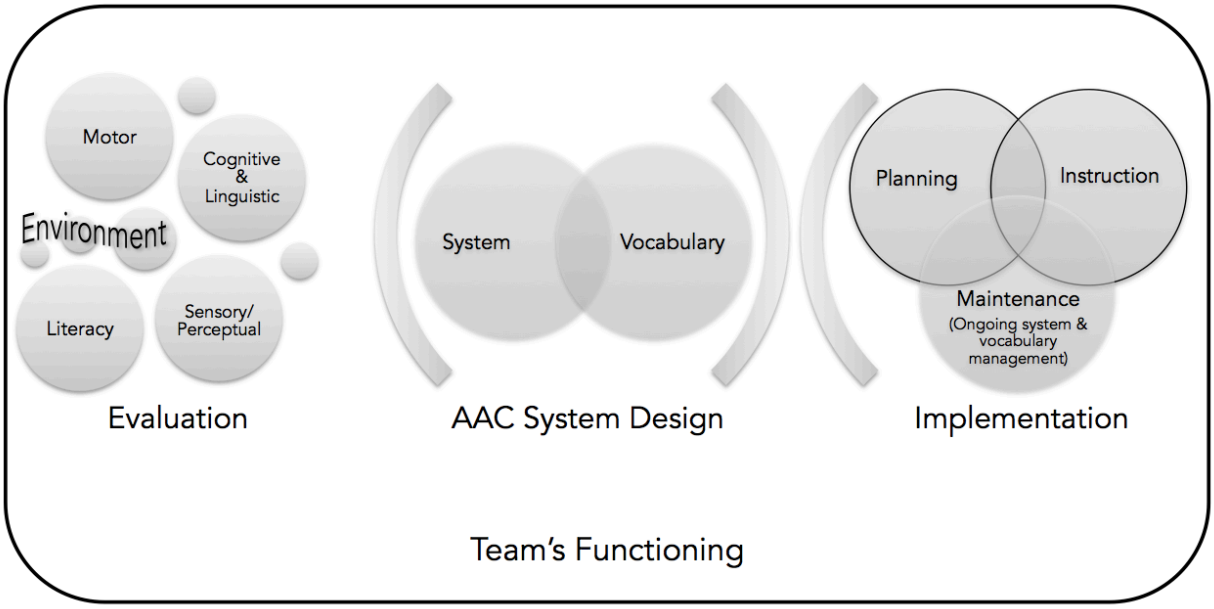


Figure 2. The basic stages of AAC service provision, situated in the context of the team's functioning as they conduct the activities. Portions addressed in this study are outlined in black.

In spite of overwhelming support for a team approach to AAC service provision, little research has been conducted to identify the practices that make an educational team's efforts successful. In the coming sections, I review the work that has been done to examine efficacious practices for educational teams who are supporting an individual with intellectual disability and CCN who uses AAC. First, I address efficacious supports for educational teams, including a review of the challenges and facilitators to team functioning and a review of the empirical research on interventions directed at team functioning when supporting AAC. Second, I review efficacious practices for developing adults' instructional competence to support a child's AAC learning. Third, I identify three fundamental, evidence-based instructional strategies for teaching AAC skills to a child with an intellectual disability. At the end of each of these sections, I offer a discussion, labeled *Putting It All Together*, of how the information presented informed the two interventions included in this study; Intervention 1 was a structured team meeting using a scripted agenda that supported team functioning and planning for AAC instruction, and

Intervention 2 was one-on-one coaching with members of the educational team in the use of instructional strategies for teaching the child to use AAC. I close with a discussion of how this study contributes to the field's understanding of how educational teams can successfully support individuals with intellectual disability and CCN who use AAC and a rationale for the methods used.

Supports for Team Functioning

Researchers have exerted substantial efforts to understand the experiences of teams who support individuals who use AAC, as "organized team-generated plans seem to be required to make AAC aided systems readily accessible" (Snell et al., 2006, p. 209). The purpose of this section is to establish supports for team functioning. For the purposes of this study, *team functioning* is defined broadly as the extent to which all members of the team effectively and efficiently work collectively and individually toward the shared goals of the team. I first offer a literature synthesis that identifies the challenges AAC teams face. Then, I identify efficacious supports for team functioning from two sources: (a) a review of theories and principles that have been identified to support educational team functioning and (b) interventions addressing AAC team functioning. A majority of the supports for educational teaming for AAC available in the literature come from theory or posited principles. I close with a brief description about how these syntheses informed this study.

Challenges (or supports) to AAC team functioning. Researchers have conducted numerous surveys, interviews, and focus groups to capture the experience of those responsible for supporting individuals who use AAC and to identify factors that contribute to successful team functioning for AAC or that make such teaming efforts challenging. Here, I review this literature, purposefully expanding the review to include literature that addresses the experience

of any type of team (e.g., educational, medical) for individuals with any disability status (e.g., intellectual disability, physical disability) when supporting AAC, adopting the term "AAC team" to refer to any team that is supporting AAC. I chose to do this to more completely capture the ways in which AAC services influence team functioning.

I identified articles that (a) addressed supports and/or barriers to providing AAC services, and (b) collected self-report data from AAC team members using survey, interviews, or focus groups. This resulted in 22 such articles published between 1998 and 2015, marked with a single asterisk (*) in the reference list. Some authors identified factors that, if present, supported AAC teaming, and, if absent, obstructed successful teaming. These are included in the syntheses. Across these studies, each defined team functioning, but here, I defined team functioning as all members of the team effectively and efficiently work collectively and individually toward the shared goals of the team. As these studies were all based on self-reports from participants (i.e., survey, interviews, focus groups), these factors have not been empirically demonstrated as influential.

To synthesize these 22 articles, I identified six categories that capture what can either facilitate success or pose a challenge to AAC team functioning in this literature base: (a) philosophy, (b) experience, (c) commitment, (d) context, (e) training and support, and (f) interpersonal skills. Like many things, the presence of a factor that supports success poses a significant challenge when it is absent, or, conversely, the absence of a factor that would pose a challenge to success may act as a support. Thus, these six factors act on a continuum from being a source of challenge to supporting the team's functioning.

Philosophy. Philosophy about AAC relates to the attitudes, perceptions, and beliefs of the team members. Twelve of the 22 studies identified ways in which philosophy impacts an AAC

team's functioning. The extent to which each member has developed their philosophical stance about AAC for the individual they are supporting and the extent to which these individual philosophies interact well together influence the success of the team (Angelo, 2000; Balandin & Iacono, 1998; Baxter et al., 2012; De Bortoli, Arthur-Kelly, Foreman, Balandin, & Mathisen, 2011; De Bortoli et al., 2014; Johnson et al., 2006; Lund & Light, 2007; Parette et al., 2004; Sutherland, Gillon, & Yoder, 2005). This includes the extent to which professional team members value and give weight to the family's role in the process (Baxter et al., 2012; Parette et al., 2000; Saito & Turnbull, 2007) and the extent to which each member is aware of their own biases, values, and expectations and are culturally sensitive (McCord & Soto, 2004; Parette et al., 2000).

Experience. In all 22 studies included, the extent to which members of the team have experiences with AAC was noted as an important factor in the extent to which a team experiences success or faces challenges. De Bortoli and colleagues found that a lack of experience, knowledge, and skills in collaboration around AAC systems acted as a barrier to successful teaming (De Bortoli et al., 2011, 2014; De Bortoli, Balandin, Foreman, Mathisen, & Arthur-Kelly, 2012), and Calculator (2014) noted that knowledge and experience specific to nonsymbolic methods of communication influences team success. McDonald, Harris, Price, and Jolleff (2008) noted that a lack of experience, knowledge, and skills in supporting AAC also influences the success of the team's efforts, and that having at least one member of the team who is an expert in AAC may be critical (see also Sutherland et al., 2005). Regardless of experience, the extent to which each member is willing to learn and be taught about AAC or the particular needs of the child influence team functioning (Bailey, Stoner, et al., 2006). Some researchers noted that having team members who have had previous positive experiences with AAC may

facilitate team success (De Bortoli et al., 2014). The work of Batorowicz and Shepherd (2011) was not included in the 22 articles because they were evaluating a particular team protocol used in Canada; however, they found that the range of years of experience across members of a team also influences the team's success.

Commitment. Five of the 22 included studies noted that the extent to which each member of the team is committed to the AAC plan influences team functioning (Bailey, Stoner, et al., 2006; Calculator, 2014; Parette et al., 2000; Stoner, Angell, & Bailey, 2010; Sutherland et al., 2005). Commitment included the extent to which the team is willing to develop and implement a plan that is motivated by and focused on the individual who is using AAC, consistently avoiding pursuit of activities that are motivated by other factors (e.g., a professional's comfort with a particular AAC system; Bailey, Stoner, et al., 2006; Stoner et al., 2010). It also included the extent to which the team implemented the plan with continuity across team members and prevented abandonment of the AAC system(s) (Bailey, Stoner, et al., 2006; Calculator, 2014; Parette et al., 2000; Sutherland et al., 2005).

Context. Multiple contextual factors emerged across the studies reviewed. I use the term to refer to aspects of the situations under which the team must function that influence the success of their efforts. These include (a) sufficient time to communicate and/or meet with one another, maintain the AAC system(s), move efficiently from evaluation to implementation, and implement AAC plans with the individual (Bailey, Parette, et al., 2006; Bailey, Stoner, et al., 2006; De Bortoli et al., 2011, 2014, 2012; Johnson et al., 2006; McDonald et al., 2008; Simpson et al., 1998; Sutherland et al., 2005); (b) sufficient staffing, including access to an AAC specialist or expert (De Bortoli et al., 2011, 2014, 2012; Sutherland et al., 2005); (c) sufficient resources, including access to technology, including loanable devices for evaluation and professional

development experiences (Angelo, 2000; Balandin & Iacono, 1998; Baxter et al., 2012; De Bortoli et al., 2011; 2014; 2012; Sutherland et al., 2005); and (d) access to sufficient funding for staffing and for AAC systems and related equipment (De Bortoli et al., 2011, 2014; Goldbart & Marshall, 2006; McDonald et al., 2008; Meder & Wegner, 2015; Sutherland et al., 2005).

Training and support. Eighteen of the 22 studies reviewed identified training and support as critical to feeling successful as an AAC team. This included: (a) access to experts in AAC and other related domains of human functioning (e.g., vision and/or hearing specialists; Balandin & Iacono, 1998; De Bortoli et al., 2011, 2014; McDonald et al., 2008; Meder & Wegner, 2015; Parette et al., 2000; Sutherland et al., 2005); (b) professional development opportunities that were situated in context, were practical, and hands-on rather than presenting only general or basic information related to AAC (Angelo, 2000; Balandin & Iacono, 1998; De Bortoli et al., 2011; Simpson et al., 1998); (c) training in the use/programming/maintenance of the specific AAC system(s), especially high-technology components, used by the individual (Angelo, 2000; Baxter et al., 2012; Johnson et al., 2006); and (d) access to ongoing training and mentoring (Bailey, Stoner, et al., 2006; Balandin & Iacono, 1998; Barker et al., 2013; Baxter et al., 2012; De Bortoli et al., 2014, 2012; Johnson et al., 2006; Parette et al., 2000; Simpson et al., 1998). In six studies, the authors pointed out that families, not just professionals, need access to training and support in AAC (Baxter et al., 2012; Johnson et al., 2006; Lund & Light, 2007; Meder & Wegner, 2015; Parette et al., 2004; Saito & Turnbull, 2007).

Interpersonal skills. As with any context in which human beings must interact with one another collaboratively, the interpersonal skills each person in the group brings to the team can greatly influence the functioning of the team (King-Sears, Janney, & Snell, 2015). Eleven out of the 22 studies reviewed identified interpersonal skills as a factor influencing team functioning.

Each member's ability to work well with others, communicate clearly (e.g., not using jargon, honesty), and engage in the work of the team with respectful attention to the cultures of the other team members and the individual using AAC interacts to influence the team's overall functioning (De Bortoli et al., 2011; Lund & Light, 2007; McCord & Soto, 2004; McDonald et al., 2008; Parette et al., 2000; Saito & Turnbull, 2007). The extent to which the professionals on the team value and support the family also plays a critical role in the team's successful functioning (Bailey, Parette, et al., 2006; Bailey, Stoner, et al., 2006; Baxter et al., 2012; De Bortoli et al., 2014; Goldbart & Marshall, 2006; Lund & Light, 2007; McCord & Soto, 2004; Parette et al., 2000; Saito & Turnbull, 2007).

Theory and principles to support AAC team functioning. In schools, AAC is just one of the many responsibilities of the educational team, as they are responsible for the child's academic and functional skill development. Thus, broader theories and principles of teaming to support an individual with disabilities are relevant to understanding supports for such an educational team. I identified four germane areas, including: (a) a theory of the stages of team development, (b) principles of collaborative teaming in schools, (c) principles for family-school partnerships, and (d) the role of meetings in educational teaming.

A theory for stages of team development. In 1965, Bruce Tuckman proposed that groups of people put together for a specific purpose (i.e., a team) progress through four stages of development: forming, storming, norming, and performing (Tuckman & Jensen, 1977). In 1977, Tuckman and his colleague added a final stage, adjourning, to the hypothesis. In the forming stage, the group orients to their task. Then, as they respond to the tasks demands, they enter the storming stage. By engaging in an open exchange of interpretations about their task, the team engages in norming. Finally, when solutions emerge, the team begins to perform, which refers to

the effectiveness and efficiency of the team's functioning; the team may be implementing their plans with the student during any of the stages of team development but not be performing well as a team until storming has taken place. When the tasks set before the team are completed or when team composition changes, the team adjourns.

These stages are useful in understanding the experience of educational teams broadly and of an educational team tasked with supporting AAC (Robinson & Solomon-Rice, 2009). Given the various tasks the team must successfully complete (e.g., develop plan for academic progress, develop plan for functional skill development) and the various transitions in the child's life that the educational team oversees (e.g., into preschool, into adulthood), Tuckman's model of team development can support teams' efforts to function well (Robinson & Solomon-Rice, 2009). This model can be used to facilitate the development process for a team by explicitly and intentionally engaging in each stage (Dieker & Ousley, 2006).

Principles of collaborative teaming in schools. The stages team development can be applied across many types of teams. In their textbook, *Collaborative Teaming,* King-Sears, Janney, and Snell (2015) outlined guiding principles for how educational teams can move through these stages to successfully work together to support students with disabilities. They identified four semi-sequential components for developing and functioning as a collaborative team that closely align with Tuckman's model of team development: (a) building team structure (i.e., form), (b) learning teamwork skills (i.e., storm), (c) problem solving and action planning (i.e., norm), and (d) implementation (i.e., perform). For each stage, they specify activities that encourage progression through these phases to strong and effective team functioning.

*Form—Building team structure***.** To effectively collaborate, a team must organize and build the supports they need to function. Activities that facilitate building this team structure

include: (a) securing school policies and administrative support for collaboration within the school; (b) each member articulating his/her personal belief system as it relates to collective responsibility; (c) defining the purpose and focus of the team and establishing shared values and goals; (d) establish who the team members are and define roles and responsibilities for each; (e) create and protect time and space (including online) to collaborate; (f) establish ground rules for team meetings, communication, processes, and schedules; and (g) establish the importance of trust and equal distribution of responsibility among team members.

Storm—Learning teamwork skills. Once the team structure is in place, the team members must learn the specific skills necessary to function effectively and how those skills are best used within their particular team. These skills include: (a) listening and interacting well, (b) communicating accurately and clearly, (c) give and receive information constructively, (d) make decisions by consensus, (e) respect diverse cultures and language on the team, (f) foster positive interaction between professionals and family members on the team, (g) constructively resolve conflicts, (h) collaborate effectively in spontaneous situations, and (i) routinely and constructively reflect on the team process (King-Sears et al., 2015).

Norm—Problem solving and action planning. With the team structure in place and the members engaged in developing their teamwork skills, the team can begin to engage in problem solving, creating action plans, and coordinating the actions they will take. To do this, King-Sears et al. (2015) recommended identifying common issues for the student and then using the mnemonic IGNITE to remember a seven-step problem solving process: (I)dentify the problem, (G)enerate possible solutions, (N)ote pros and cons of the possible solutions, (I)dentify a solution, (T)arget an action plan, and (E)valuate the plan and make needed changes (p. 94). This strategy can be used whenever situations arise. They also suggest identifying ways to involve the

student on the team, organizing documents, and developing a plan for coordinating activities across all team members as the team moves from planning to implementation.

Perform—Implementation. At this point, the team begins to function individually, in small groups, and collectively from a joint plan and engages in the work of implementation. Here, different members likely adopt different models of collaboration, such as consulting or co-teaching, to carry out their given responsibilities (King-Sears et al., 2015).

Although the team will likely continue to cycle through these stages, adjusting their team structure, developing and modifying their teaming skills, and engaging in ongoing problem solving and action planning (i.e., form, storm, and norm), the team's implementation moves ever closer to peak performance and effectiveness (i.e., perform).

Principles for family-school partnerships. As previously mentioned, critical to collaborative teaming in education is power-shared partnerships between the professional and family members of the team (Turnbull et al., 2015). In their seminal textbook, *Families, Professionals, and Exceptionality,* Turnbull and colleagues (2015) set forth seven principles of partnership between the professionals and family members on a child's team—communication, respect, equality, professional competence, advocacy, commitment, and trust—and identified practices that promote these principles, displayed in Table 1. These principles are applicable regardless of the types of skills the team is seeking to foster in a child. Thus, by applying these principles to an educational team who is supporting a child who uses AAC, when each member of an AAC team successfully engages in the activities that promote true, power-shared partnerships, they increase the likelihood of their efforts producing the desired outcomes for the child and family (Turnbull et al., 2015).

Table 1

Activities that promote the principles of partnership

Principle	Activities
Communication	Be friendly, clear, and honest; listen; provide and coordinate information
Respect	Honor cultural diversity, affirm strengths, treat student & others with dignity
Equality	Share power, foster empowerment, provide options
Professional competence	Provide an appropriate education, continue to learn, set high expectations
Advocacy	Prevent problems, be alert for opportunities to advocate, pinpoint & document problems, broaden alliances, create win-win solutions
Commitment	Be sensitive to emotional needs, available, & accessible; go above & beyond
Trust	Be reliable, use sound judgment, maintain confidentiality, trust yourself

Note. These principles are summarized from Chapter 7 of *Families, Professionals, and Exceptionality* by A. Turnbull, R. Turnbull, E. Erwin, L. Soodak, and K. Shogren, 2015. Copyright by Pearson Education, Inc.

The role of meetings in educational teaming. While the practices of collaborative teaming outlined above must be integrated throughout all interactions, team meetings play a crucial role in successful teaming. Educational teams are required to hold meetings to address certain aspects of the child's educational program (IDEA, 2004) and meetings are integrated into the structure of schools' functioning (King-Sears et al., 2015; Turnbull et al., 2015). In addition, meetings have been identified as a critical component of successful teaming (King-Sears et al., 2015; Robinson & Solomon-Rice, 2009, Turnbull et al., 2015). In fact, to effectively collaborate, teams must integrate (a) regular and positive face-to-face interactions; (b) structures for implementing their plan, monitoring their performance, and addressing issues; and (c) clear accountability measures for each individual on the team to complete their agreed-upon responsibilities (Robinson & Solomon-Rice, 2009). Therefore, teams who meet regularly and maximize the usefulness of their meetings may have a more positive experience and produce more desirable outcomes from their efforts (Baxter et al., 2012; De Bortoli et al., 2011, 2014, 2012; Hunt et al., 2002; Johnson et al., 2006; Lund & Light, 2007; McDonald et al., 2008).

In summary, there are many principles and practices that are likely to support a team's efforts, but the challenge of operationalizing these in the complex contexts of school and family life to promote team functioning remains.

Interventions to support AAC team functioning. Efforts to operationalize these many principles and practices for AAC team functioning to overcome or prevent challenges have proven to be a daunting and amorphous task. I identified literature that (a) addressed interventions directed at supporting AAC team functioning and (b) reported an examination of the effects of operationalized interventions to facilitate AAC teaming. I identified four studies that met these criteria, marked with two asterisks (**) in the reference list. Only one of these studies was conducted within the context of an educational team, but I briefly describe each of the four studies here.

Alant, Champion, and Peabody (2012) studied the effects of a partnership between a university speech pathology clinic, the school team, and the family of a child in second grade who used AAC using case study methodology. Although not described with replicable precision, the intervention to support the team was composed of meetings and "frequent Internet contact" (p. 175) between the school and university SLPs as they completed two phases of collaboration. In Phase 1, the SLPs made decisions about the AAC system that would be most appropriate for the child and acquired the device selected. In Phase 2, the SLPs worked on intervention strategies to support the child's learning and skill development. Unfortunately, the authors did not provide much description of how these collaboration efforts were structured or report on any measures or perceptions of how these efforts facilitated or impeded team functioning. They reported on the child's communication growth, but these results were mixed (e.g., increased scores on pre-/post-tests, decrease in observed initiations after intervention).

Batorowicz and Shepherd (2011) examined the Prescriptive Review (PR) meeting process that AAC centers in Ontario, Canada were required to use. The PR meeting consisted of (a) a clinical presentation of a client's case by the primary clinicians, (b) a discussion among the clinicians about the AAC recommendations, and (c) a team decision for final recommendation and an implementation plan. Using a survey designed to evaluate this program, a majority of the 92 participants reported that they perceived the PR process as helpful in developing quality AAC services, enhancing their learning as professionals, encouraging peer support among clinicians, and facilitating successful decision-making in an appropriate amount of time. Smaller teams were associated with more positive experiences and less negative socio-emotional behavior, and clinicians who perceived PR as beneficial were more likely to have positive views about aspects of the process. Parents and the individuals receiving services did not participate in PR meetings.

Hunt, Soto, Maier, Muller, and Goetz (2002) examined the effects of the Unified Plan of Support (UPS) collaborative teaming process on (a) three educational teams' perception of its ecological validity, (b) three children's observed communication, and (c) the team members' perceptions of the changes in the child's communication and social participation in school. The UPS consisted of regularly scheduled team meetings, a facilitated initial meeting to develop a plan of supports to increase the child's academic and social participation in regular education instructional activities, and a built-in accountability system of reporting and observations about implementation. Supports identified included co-teaching arrangements between the general and special education teacher, small-group and individual tutoring, and direct support from the special education teacher, the AAC specialist (the SLP on the team), and an instructional assistant. Using multiple baseline design across teams, the authors demonstrated that the UPS plan of supports and implementation efforts resulted in three children's increased interactions

with peers and some increase in initiating communication and using AAC. They also demonstrated a decrease in the time the children spent disengaged from classroom activities. In addition, using data collected from interviewing the adult team members, the authors found that all the adults perceived the children as improving in their academic performance over the course of the implementation of the UPS. Finally, the authors found that the three teams who participated in the UPS reported (a) benefitting from the monthly meetings, (b) feeling less isolated and solely responsible for communication outcomes as a result of the collective data analysis of children's performance in these monthly meetings, (c) expanding their visions of possible inclusion in regular education and integration of communication into these settings for the children they supported, and (d) creating a more cohesive and comprehensive support plan as a result of the UPS process. All team members reported feeling that the UPS was flexible and allowed them to refine their support plans easily and mold to their individual team preferences.

Finally, Lamontagne, Routhier, and Auger (2013) examined how the Technique for Research of Information by Animation of a Group of Experts (TRIAGE) affected a team's ability to develop consensus around what AAC outcomes were important to measure across their clientele at a rehabilitation center in Quebec, Canada. Their caseload was comprised of adults and children, although a majority were adults. Before participating in the TRIAGE process, the team members were given four mandatory readings about outcome measurement and participated in a three-hour lecture on that topic. Then, the team participated in the TRIAGE process, which is completed in two steps. First, team members individually identified their own preferences and perspectives about an element (in this case, the outcome measures believed to be most important to individuals who use AAC). Then, the team met together to come to consensus about the most important elements for their group. In this case, the individual outcome measures

identified in Step 1 were discussed and either retained as important, reserved for further discussion later, or dismissed. This process was repeated, using a visual representation of the discussion similar to a flowchart, until the five highest-priority elements were agreed upon. The authors found that participants increased their readiness to implement AAC outcome measurement, with some team members actually taking action toward this. In addition, the team reached consensus about the outcome measures they wanted to use in their program.

Putting it all together. In the preceding section, I summarized the challenges AAC teams face, theory and principles that contribute to team functioning, and the limited work on interventions addressing AAC team functioning. Continued efforts to develop effective, operationalized practices that support team functioning and are feasible in school systems and families lives are needed. From the topics reviewed in this section, holding team meetings is indicated as a likely outlet for addressing team functioning, and four main characteristics of interventions situated within team meetings are indicated. First, the intervention should ameliorate challenges that are commonly associated with AAC service provision. Second, the intervention should encourage progression through the stages of team development to help the team reach the "performing" (Tuckman & Jensen, 1977; or "implementation," King-Sears et al., 2015) stage. Third, the intervention should foster partnership between the family and professional members of the team. Finally, based on the few interventions that have addressed AAC team functioning, the intervention should facilitate goal setting and consensus building around that goal, facilitate problem-solving and conflict resolution, and incorporate methods for holding members accountable to reporting on the child's progress toward the identified goals.

For the purposes of the proposed study, I compiled this literature into a Team Forming Meeting agenda that an educational team can follow to form around the task of supporting the

child's AAC. The agenda is described subsequently. The agenda is an operationalized process for supporting an educational team's functioning as they plan for implementation of an identified AAC system (see Figure 2).

In addition to planning, the team must also function around the activities of instruction (see Figure 2), and parents and professionals will likely require ongoing supports to successfully and accurately implement their plan with the child (Kretlow, Cooke, & Wood, 2011). The team members who are responsible for providing instruction (referred to here as AAC Facilitators) must provide consistent and effective instruction, as children with severe disabilities may not generalize skills across people, settings, or materials and often struggle to maintain skills over time without intentional supports to promote such generalization and maintenance (Snell & Brown, 2011; Snell et al., 2006). Thus, in the coming section, I review the literature on supports for teaching adults the skills they need to provide effective instruction.

Supports for Teaching Adults to Instruct Children in AAC Use

Members of the AAC team are tasked with teaching the child with intellectual disability and CCN to use language via an AAC system. To this point, I have described the supports the team members need to function, focusing mostly on building consensus and planning for this work. Now, I turn to supports the team members need to move from planning to implementation of AAC instruction with the child. Providing the team members with supports for developing instructional competence is critical to the child's success with AAC, as doing so has been demonstrated, through a meta-analysis of the literature, to have "positive effects on communication performance of individuals using AAC" (Kent-Walsh et al., 2015, p. 9). I address three relevant areas of research. First, I provide an overview of adult learning theory, which is useful in understanding how adults acquire new skills, such as the skills necessary to

teach a child to use AAC. Second, I address relevant work completed in the field of implementation science to articulate the steps required to translate a plan for instruction into implemented instruction. Third, as the combined efforts in these two fields indicates coaching as an essential component to translating planned action into implemented practice, I present a review of research literature that has addressed adult coaching in supporting a child who uses AAC. I close with a brief summary of how these syntheses informed the current study.

Adult learning theory. Adult learning theory and andragogy, or "the art and science of helping adults learn," have been much discussed and debated (Knowles, Holton, & Swanson, 2015; Merriam, 2001). The complexities of these debates are outside the purview of this review, but Knowles and colleagues (2015) outline the six core principles that are currently said to make up adult learning. First, the adult learner needs to know why they need to learn something. Second, the adult learner's self-concept of being responsible for their own decisions requires self-directed learning opportunities. Third, the adult learner brings previous experience that requires individualization and experiential instructional techniques. Fourth, the adult learner's readiness to learn is situated in the real-life applicability of the content. Fifth, the adult learner's orientation to learning is life-, task-, or problem-centered, unlike children whose orientation is subject-centered. Sixth, the adult learner is motivated to learn by both external and intrinsic motivators. These principles act as markers that are thought to distinguish adult learners from child learners and, when considered, can help those designing adult learning opportunities to create more effective learning processes (Knowles et al., 2015).

One practical method for designing instruction that takes these principles into account is the Whole-Part-Whole learning model, depicted in Figure 3 (Knowles et al., 2015). The instruction is designed to first introduce the adult learner to the new content they will learn. At

the beginning of a learning opportunity, adult learners are presented with a complete overview of the content they are going to learn. This “first whole” (Knowles et al., 2015, Chapter 13, paragraph 8) is presented to help the learner orient to their need for the content and the task of learning it while activating their previous related experiences. Then, using systematic instruction based on behavioral principles, the learner is taught the components of the content until each component is mastered (Knowles et al., 2015). With mastery of each part, the learners reconstitute the parts into their whole and engage in repetitive practice of all the components together to facilitate transfer to long-term memory and develop automaticity (i.e., successive, rapid use of the parts as a whole without thinking through each step; Knowles et al., 2015).

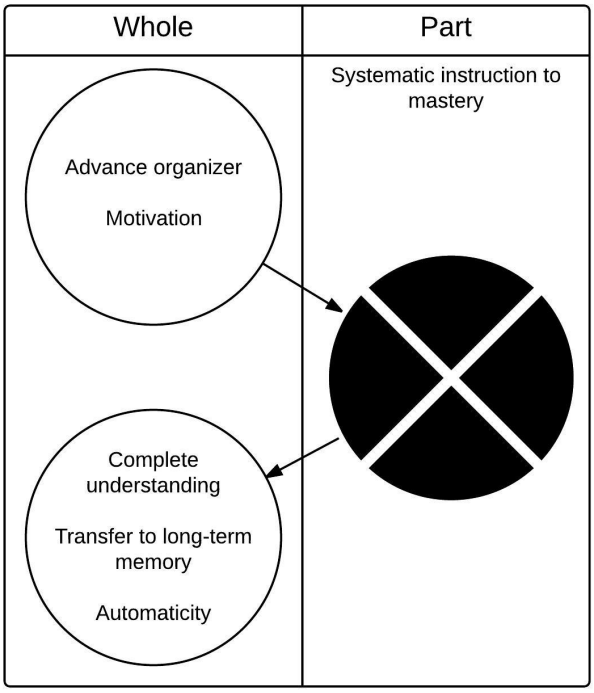


Figure 3. Depiction of the Whole-Part-Whole learning model. Adapted from "Chapter 13: Whole-Part-Whole Learning Model" in M. Knowles, E. Holton, III, and R. Swanson, *The Adult Learner*. Copyright 2015 by authors.

The principles of adult learning are particularly applicable in the context of an educational team for a child with intellectual disability who uses AAC because most, if not all, members of the team likely have no or minimal experience with AAC (Sutherland et al., 2005).

Thus, they will benefit from supports that incorporate these principles as they learn innumerable new ideas, concepts, and skills to successfully support the child.

Implementation science. Implementation science is the scientific examination of methods that promote the systematic uptake of research-defined practices into the routine practice in authentic settings (Cook & Odom, 2013). Research efforts to develop and test effective methods for teaching children a particular skill are only of value when those methods are translated into children's educational experience. Implementation science is devoted to the study of translation efforts.

Fixsen, Naoom, Blase, Friedman, and Wallace (2005) conducted an extensive review of the literature on implementation and identified six stages of implementation: (a) exploration and adoption in which the team identifies evidence-based instructional strategies, develops a plan for using these strategies, and establishes consensus and commitment to this plan within the team; (b) program installation in which the team gathers the supports they need to implement their plan and learns the basics of the identified strategies; (c) initial implementation during which the team members implement their plan, applying the identified instructional strategies with the child and developing proficiency with those strategies; (d) full operation in which all team members have mastered the strategies and implement them in concert with one another across all their interactions with the child; (e) innovation in which the team members are fluent enough in the strategies and their combined application to problem-solve, innovate, and evaluate their plan; and (f) sustainability in which the team develops and maintains processes for integrating new team members, navigating obstacles, and persisting in the activities of the intervention.

Fixsen and colleagues (2005) also identified three common challenges that individuals experience when they are trying to learn how to implement new skills. Because the strategies to

teach language and AAC may be new skills for many members of an AAC team (Sutherland et al., 2005), they are likely to (a) use instructional strategies unsophisticatedly compared to a master practitioner; (b) lack confidence in using the strategies and, therefore, be vulnerable to negative reactions from others and/or themselves; and (c) not fully understand the strategies after initial instruction in their use and require support to develop fully functional capability (Fixsen et al., 2005). To ameliorate these challenges, Fixsen et al. found substantial evidence to support the use of training in concert with embedded coaching. Joyce and Showers (2003) concluded, after an extensive literature review, that training and coaching must coexist to produce changes in teachers' behaviors, and Fixsen et al. (2005) found evidence of this across many other areas of professional development. Thus, I address coaching in the following section.

Coaching. Coaching is defined as:

> an adult learning strategy in which the coach promotes the learner's (coachee's) ability to reflect on his or her actions as a means to determine the effectiveness of an action or practice and develop a plan for refinement and use of the action in immediate and future situations. (Rush & Shelden, 2011, p. 8)

Rush and Shelden (2011) identified five key characteristics that distinguish coaching from other types of teaching techniques, displayed in Figure 4. First, coaching includes joint planning in which the coach and the coachee agree on the actions each will take and/or the opportunities to practice those actions between coaching visits. Second, coaching requires observation in which one person observes the other's actions to develop new skills, ideas, or strategies. Third, the coachee practices the target skill or engages in an activity (i.e., action), giving the coach an opportunity to provide feedback on performance or the coach engages in activity for the coachee to observe as a model. Often, observation and feedback occur simultaneously. Fourth, coaching involves reflection in which the coach and/or the coachee analyze their actions and determine the extent to which those actions are aligned with evidence-based practices and how those actions

need to be implemented and, perhaps, modified to produce the intended outcome. Fifth, coaching requires that the coach give feedback to the coachee that expands or affirms the coachee's current level of understanding.

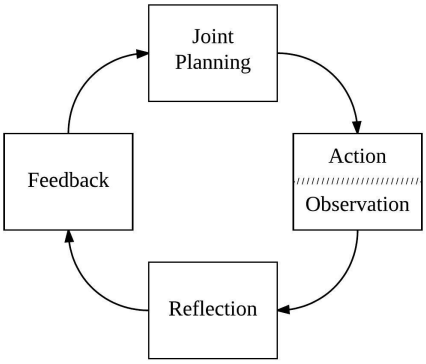


Figure 4. The characteristics of coaching, as identified by Rush and Shelden (2011).

As defined here, coaching has been used successfully with both parents and education professionals in special education (Rush & Shelden, 2011). To examine its application in AAC intervention, I turned to a body of literature addressing communication partner instruction.

Communication partner instruction. Supporting the team members' AAC instructional skills is critical. When teaching a child to communicate, the team members act as communication partners, or the people to whom the child who uses AAC speaks. The role of the communication partner for someone using AAC is different because, when an external AAC system is introduced into a communication exchange, the experience becomes a "quadratic interaction between two people, a shared focus of attention, and the AAC system" (Shire & Jones, 2014, p. 1), rather than just between two people and a shared focus of attention. When the child is still learning to use AAC, many of the adult partners must act as both a communication partner and instructor. Thus, researchers and professionals have identified supports for communication partners to help them learn how to navigate the complex interaction and better support the

individual who is learning to use AAC (Beukelman & Mirenda, 2013; Kent-Walsh et al., 2015; Shire & Jones, 2014).

In 2005, Kent-Walsh and McNaughton identified an eight-step model for communication partner instruction. First, communication partners (a) take a pretest to measure their spontaneous use of the skills to be taught and how the individual who uses AAC responds, and (b) commit to the instructional program after the instructor describes the communication partners' strengths and weaknesses (based on the pre-test) to them and provides them with information about what the instructional program will entail. Second, the instructor provides a description of the target strategy, including a method for remembering its components (e.g., mnemonic) and a description of how the strategy is expected to impact the individual who uses AAC. Third, the instructor demonstrates the target strategy. Fourth, the communication partners engage in verbal practice of the strategy steps, naming and describing each step. Fifth, the communication partners practice the strategy in controlled environments, such as role-plays, while the instructor provides and gradually fades prompts and feedback. Sixth, the communication partners practice implementing the strategy with the individual who uses AAC in multiple situations within naturally occurring routines, during which the instructor provides prompting and feedback. Seventh, the instructor determines the communication partners' mastery of the target skill from performance data collected, elicits feedback from the communication partners, individual using AAC, and other relevant stakeholders about their experience, and generates action plans for promoting generalization and maintenance of the communication partners' skills. Eighth, the communication partners implement the strategy in a variety of settings to promote its generalized use and develop plan for long-term implementation.

These steps have been widely used by Kent-Walsh, McNaughton, and their colleagues, as demonstrated in the following review. Steps one through five represent steps in the training process; in step six, the communication partner received coaching; steps seven and eight are devoted to ongoing maintenance. This process is useful in designing supports for communication partners, but the authors' description of coaching (i.e., step six) includes only three of the five characteristics of coaching identified by Rush and Shelden (2011); that is, the authors include observation, action, and feedback. I posit that joint planning and reflection should be incorporated into this step.

Impact of communication partner instruction. To understand how communication partner instruction impacts the communication outcomes of individuals who use AAC, Kent-Walsh and colleagues (2015) conducted a meta-analysis of 17 intervention single-case research studies teaching communication partners to support AAC. The interventions in the 17 studies they reviewed included at least two of the components in steps 2-6 identified by Kent-Walsh and McNaughton (2005) and described in the previous section.

The authors calculated effect sizes using improvement rate difference (IRD), a measure of effect size often used in single-case research, of the interventions in the 17 studies by various characteristics (e.g., intervention characteristics, participant characteristics) and concluded that communication partner instruction had strong positive effects on the communication skills of the individual using AAC, indicating that "partner instruction should be viewed as an integral part of AAC assessment and intervention" (Kent-Walsh et al., 2015, p. 10). Of particular relevance to the current study, they found that communication partner instruction had a very large effect (IRD = .86) on the communication outcomes of individuals with intellectual or developmental disability and a very large effect (IRD = .92) on the communication outcomes of individuals with

multiple disabilities, and they found that such instruction can be effectively implemented with a wide variety of communication partners, including parents, teachers, and educational assistants (Kent-Walsh et al., 2015). However, these findings should be interpreted with caution, as IRD has limitations (Manolov, Solana, Sierra, & Evans, 2011).

Coaching in communication partner instruction. To further understand how educational team members develop the skills they need to implement effective AAC interventions, I reviewed studies in which adults had received coaching. I chose to select from studies that were included by Kent-Walsh et al. (2015) in their meta-analysis because they established that each of the 17 studies they analyzed had sufficient evidence to warrant analysis of effect and, when analyzed, produced positive effects (as measured by IRD) on the communication skills of an individual using AAC for at least one participant in the study. To be included in my review, an adult (over age 18) had to be observed implementing AAC instruction with an individual who used AAC. After reviewing each article in full, I identified seven studies that met this inclusion criterion, marked with three asterisks (***) in the reference list (Binger, Kent-Walsh, Berens, Del Campo, & Rivera, 2008; Binger, Kent-Walsh, Ewing, & Taylor, 2010; Datillo & Light, 1993; Kent-Walsh, 2003; Kent-Walsh, Binger, & Hasham, 2010; Rosa-Lugo & Kent-Walsh, 2008; Westover, 2010).

I reviewed each study to identify which of the five coaching characteristics identified by Rush and Shelden (2011) were included in the procedures and to whom the intervention was directed (i.e., parents or professionals). Across all seven studies, all authors reported including action and observation. However, in two studies, the author made no mention of following that action/observation with feedback (Binger et al., 2008; Rosa-Lugo & Kent-Walsh, 2008), which implies that coaching did not occur. None of the authors reported including joint planning or

reflection in their coaching procedures. Three interventions were directed at parents (Binger et al., 2008; Kent-Walsh et al., 2010; Rosa-Lugo & Kent-Walsh, 2008) and four at professionals (Binger et al., 2010; Dattilo & Light, 1993; Kent-Walsh, 2003; Westover, 2010), with Datillo and Light also providing coaching to an adult peer. These results are represented in Table 2.

Table 2

Coaching Characteristics Used in AAC Communication Partner Intervention Studies

			Coaching Characteristics			
Article	Coaching recipients	Mean IRD[a]	Joint planning	Action & observation	Reflection	Feedback
Binger et al., 2008	Parents	1.0	-	+	-	-
Binger et al., 2010	Professionals	.80-1.0	-	+	-	+
Dattilo & Light, 1993	Professionals, Peer	.66-1.0	-	+	-	+
Kent-Walsh, 2003	Professionals	1.0	-	+	-	+
Kent-Walsh et al., 2010	Parents	1.0	-	+	-	+
Rosa-Lugo & Kent-Walsh, 2008	Parents	1.0	-	+	-	-
Westover, 2010	Professionals	.97-1.0	-	+	-	+

Note. Parents are mother, father, or guardian. Professionals are any paid members of a team; in all studies here, professionals were educational assistants. IRD is improvement rate difference, which is a measure of effect size on the child's communication. An IRD >.5 is considered acceptable, with values closer to 1.0 representing larger effects. Ranges in IRD indicate that multiple children participated in that study and that the effect sizes across those participants fell within that range. Coaching Characteristics are those identified by Rush and Shelden (2011).
[a]IRD as reported by Kent-Walsh et al., 2015

In spite of the absence of reported joint planning and reflection in these studies and even when feedback was not explicitly present, all the interventions produced sufficient change in the behavior of the participating communication partners to produce moderate to strong effects on the communication skills of the individual who used AAC (see IRD in Table 2). Action and observation was paired with at least a descriptive overview of the procedures, with Dattilo and Light (1993) also including modeling and role play, and the remaining four studies also

including modeling, verbal practice, and role play (Binger et al., 2008, 2010; Kent-Walsh et al., 2010; Kent-Walsh, 2003; Rosa-Lugo & Kent-Walsh, 2008). Thus, given access to at least a description of the procedures to be used and being observed using the procedures with the individual, parents and professionals developed skills that facilitated communication skill development in individuals who use AAC.

Kent-Walsh and colleagues (2015) did not evaluate the fidelity of implementation or the effects on the communication partners' behavior, and the clarity of reports about this varied across the seven studies I reviewed. For example, Kent-Walsh et al. (2010) did not report the data on the communication partners' performance while Rosa-Lugo and Kent-Walsh (2008) did. In addition, in two studies (Binger et al., 2008; Rosa-Lugo & Kent-Walsh, 2008), the report did not clearly indicate feedback but observing another's performance without comment is unlikely. Thus, perhaps some coaching did occur in these two studies but the content of those interactions is unknown. Given these ambiguities, conclusions as to the effect of coaching on the communication partners' behavior are limited to specific conclusions within each report when the necessary data are provided. If future efforts incorporate all characteristics of coaching, the extent to which these additional features are implemented with fidelity and their impact on the outcomes for both communication partners and children could be evaluated.

Putting it all together. In this section, I summarized adult learning theory and the stages of implementation as they relate to teaching team members the skills they need to provide instruction to the individual using AAC (see Figure 2). Then, because coaching is critical to both adult learning and effective implementation, I reviewed the characteristics of coaching and how coaching and other instruction for communication partners has been applied to providing AAC instruction. Taken together, any intervention addressing AAC service provision should include

supports for implementation, and training followed by coaching is indicated as the most effective process for providing these supports.

I integrated these implications into the current study. Some portions have been integrated into the Team Forming Meeting agenda described in the previous section. In addition to this structured meeting, the AAC Facilitators on the team (i.e., members with AAC instructional responsibilities) received one-on-one coaching in the use of instructional strategies. The protocol for coaching sessions was based on the literature reviewed here and is described subsequently.

To this point, the literature reviewed has indicated that AAC teams need supports in functioning as a team for developing instructional competence. In the next section, I address evidence-based practices for teaching children with intellectual disability to use AAC that may be considered during planning and used during instruction.

Efficacious AAC Instructional Strategies

To support the acquisition of communication skills via AAC, children with intellectual disability and CCN need consistent supports across a variety of contexts to (a) experience models of communication in the same modality(ies) they are learning to use, (b) have many opportunities to communicate, and (c) learn to both operate their AAC systems (i.e., operational competence; Light & McNaughton, 2014) and to use language with it to initiate and respond to communication (i.e., linguistic competence; Light & McNaughton, 2014). Opportunities to communicate, the skill to use one's language (i.e., linguistic and operational competence; Light & McNaughton, 2014), and access to modeling of one's language system are critical to early language development (Beukelman & Mirenda, 2013; Reichle, Halle, & Drasgow, 1998). Although there are many other dimensions to developing communicative competence (see Light & McNaughton, 2014), I focus on instructional strategies that (a) provide models of AAC use,

(b) create opportunities for the child to communicate, and (c) develop the child's operational and linguistic competence. Because "explicit instructional and language modeling strategies should be combined in a judicious mixture to support semantic development" (Beukelman & Mirenda, 2013, p. 282) and numerous opportunities to practice communication skills are necessary for mastery (Beukelman & Mirenda, 2011; Light & McNaughton, 2014), these three components are the basic building blocks from which additional dimensions of communicative competence can arise.

Researchers and professionals have developed a set of instructional strategies to provide these supports. I identified (a) Snell, Chen, and Hoover's (2006) review of 40 research studies published between 1997 and 2006 that targeted initial AAC instruction for children with severe disabilities in which they identified strategies that have been used to teach AAC to students with severe disabilities, (b) best practices in AAC instruction identified by Calculator and Black (2009), and (c) a review of evidence supporting AAC instructional strategies delineated by Schlosser & Sigafoos, 2006. I used these three sources, marked with four asterisks (****) in the reference list, to identify instructional strategies to include in my intervention.

Modeling AAC use. Individuals who use AAC typically receive input from others via spoken language, but they must use their AAC system(s) to produce a message (Binger & Light, 2007; Smith & Grove, 2003). Because children who use speech learn to comprehend and produce words that are spoken frequently to them (Harris & Reichle, 2004), efforts to provide individuals who use AAC with commensurate models are effective in increasing the AAC output of the individuals (Binger & Light, 2007; Harris & Reichle, 2004). Although not addressed in the Snell et al. (2006) review, Calculator and Black (2009) identified "opportunities to see classmates, other students, teachers, and others model effective uses of the AAC system in

everyday environments" (p. 342) as best practice, and Schlosser and Sigafoos (2006) identified conclusive evidence to support aided AAC models for expediting a child's receptive learning of graphic symbols. To date, three strategies for providing aided AAC modeling have been defined in the research literature: (a) aided language stimulation; (b) the System for Augmenting Language (SAL); and (c) aided AAC modeling. Aided language stimulation includes drawing attention to a referent of interest in the environment and then subsequently labeling that referent using the AAC system (Harris & Reichle, 2004). SAL consists of four components: (a) a speech-output communication device, (b) symbol vocabulary, (c) teaching procedures for providing symbol input and encouraging communication attempts, and (d) ongoing support and monitoring (Romski, Sevcik, Robinson, & Bakeman, 1994). The procedures for providing symbol input and encouraging communication attempts are flexible and embedded into naturally occurring routines (Romski et al., 1994). An aided AAC model is defined as the team member completing two steps when speaking to the child: (a) touching at least one symbol on the AAC system and labeling that symbol (if the child has a voice output system, the speech synthesizer will provide the label); and (b) providing a spoken expanded model that uses correct grammar and sentence structure (Binger & Light, 2007). The participating team members used aided AAC modeling.

Creating opportunities. Just as an individual needs models of language to develop communication skill, the child also needs numerous opportunities to communicate with others to practice and master communication skills (Beukelman & Mirenda, 2013). However, because individuals who use AAC are likely to have fewer opportunities to communicate because their communication partners dominate a conversation or interrupt their attempts to communicate (Kent-Walsh & McNaughton, 2005), teaching communication partners to create opportunities for them to communicate and embedding these opportunities within naturally occurring routines and

activities is considered best practice (Calculator & Black, 2009; Schlosser & Sigafoos, 2006; Snell et al., 2006). Environmental arrangement (Halle, 1984) paired with time delay (Halle, Marshall, & Spradlin, 1979) within naturally occurring routines and activities can be used to increase the number of opportunities a child has to communicate, as can the mand-model strategy (Hart, 1985).

Environmental arrangement is restructuring the environment in a way that provides the individual with an opportunity to communicate (Halle, 1984). Communication partners may engage in any combination of six activities to arrange the physical environment to occasion communication from the child: (a) presenting objects or activities that are motivating, (b) selecting objects or activities that are quickly completed, (c) selecting objects or activities that have multiple components and presenting the object/activity in a way that gives the child the opportunity to request or label each component, (d) selecting an activity with repetitive action so that the child has the opportunity to request each repetition (e.g., swinging), (e) presenting novel objects or activities to elicit a request for information from the child, and (f) presenting activities for daily living (e.g., eating, dressing) in a way that provides multiple opportunities for communication (Halle, 1984). This strategy was applied in 90% of the intervention studies reviewed by Snell et al (2006), and was indicated for use by both Calculator and Black (2009) and Schlosser and Sigafoos (2006).

Time delay is used in conjunction with environmental arrangement within a familiar routine to create an opportunity for the child to initiate communication by establishing joint attention through environmental arrangement strategies and then providing a long pause to give the child an opportunity to initiate a communication exchange (Halle et al., 1979). This strategy

was applied in 5 of the 40 studies reviewed by Snell et al. (2006), and was indicated for use in increasing or expediting signing acquisition by Schlosser and Sigafoos (2006).

The mand-model strategy can also be paired with environmental arrangement to create opportunities for the child to communicate (Hart, 1985). The strategy includes using of a question, choice, or direction to encourage communication from the individual (e.g., "What do you want?" "Do you want this or that?" "Tell me what you want.") and pausing to give the child time to respond. Snell et al. (2006) identified studies that used verbal prompts and requests, although sufficient detail was not provided to determine when these prompts or requests were applied using the mand-model strategy.

Developing operational and linguistic competence. Creating opportunities for communication does not, in and of itself, produce language and operational skills in the child who is using AAC. Instead, those strategies can be paired with systematic prompting procedures that include both antecedent and consequence strategies to be effective in developing these skills (Snell et al., 2006).

Snell and Brown (2011) set forth procedures for various systematic prompting procedures, including (a) the system of least prompts, (b) most-to-least prompting, (c) graduated guidance, (d) constant time delay, and (e) progressive time delay. All of these strategies have been used to teach a wide variety of skills, including language and AAC operation skills (Snell & Brown, 2011; Snell et al., 2006). Snell et al. (2006) found that coupling a prompting procedure with environmental arrangement was common in their review of effective interventions for teaching AAC to individuals with intellectual disability and complex communication needs. The participating team used most-to-least systematic prompting with the child.

Putting it all together. Creating opportunities for children with intellectual disability who use AAC to receive language input via AAC (e.g., aided AAC modeling), creating opportunities for them to frequently produce language output using their AAC systems (i.e., environmental arrangement, time delay, mand-model), and providing prompts to support their language and operational skills are critical to successful acquisition of AAC skills (Beukelman & Mirenda, 2011; Light & McNaughton, 2014). The evidence-based practices discussed in this section constitute the "parts" (Knowles et al., 2015) the participants in this study learned, first through training during Intervention 1 and then through one-on-one coaching during Intervention 2.

From Supports to Effective Practice

In this review, I presented the efforts to identify efficacious supports for AAC teaming and intervention. Across the components that comprise a successful AAC instruction and team functioning, varying degrees of evidence for practices exists at varying degrees of application to AAC, particularly to AAC for individuals with intellectual disability, but an increasing body of evidence supports the practices described in this chapter. Unfortunately, the need for successful AAC teaming and intervention is urgent, given the current dismal outcomes across multiple domains of human functioning for individuals who use AAC. Regardless of the state of science, while the field works to develop an expanded repertoire of efficacious practices, too many individuals are living life without an effective communication system (National Core Indicators, 2014). Citing these outcomes in their editorial in the esteemed journal, *Augmentative and Alternative Communication*, Light and McNaughton (2015) concluded:

> Now, the challenge is to continue to build on the foundation of existing AAC research and services, and to extend this work and embrace a more holistic view in order to maximize outcomes for individuals with complex communication needs. Specifically, there is an urgent need to extend AAC research and intervention (a) to build on the

> individual's strengths and focus on the integration of skills to maximize communication, (b) to focus on the individual's participation in real-world contexts (e.g., family, school, work, healthcare, and community contexts), (c) to address psychosocial factors (e.g., motivation, attitude, confidence, resilience) to maximize the resources that the individual brings to bear on the communication process, and (d) to focus on environmental factors to eliminate opportunity barriers and maximize social supports for the individual with complex communication needs. This work will require greater collaboration among clinicians, researchers, individuals who use AAC, and their families to implement state-of-the-art research methods to investigate the impact of innovative AAC services on short-term and long-term outcomes in the real world. (p. 93)

In response to this call and because this call resonates with my own professional experience as a teacher for children with intellectual disability who used AAC, I conducted this study. I believe that the urgency of the need for communication leads to a research question about effectiveness, or " if an intervention does more good than harm when delivered under real-world conditions" (Flay, 1986, p. 451). Real-world conditions include the subjective and objective experiences and feelings, actions and reactions of the people participating. Thus, I have chosen to do a mixed methods study to address the research question:

> In what ways and to what extent is a supports package for a child's educational team effective in supporting (a) the experience and functioning of the team around AAC, (b) competence in AAC instruction, and (c) the child's communication skills?

In the next chapter, I present the details of the methods I used. Mixed methods is uniquely suited to addressing questions about the effectiveness of a practice because it allows for equal value to be placed on the context and experience of those in those real-world conditions and on the efficacy of the supports provided to them when analyzing and interpreting data collected around the question. Mixed methods also allows for mixing at a paradigmatic level (Greene, 2007), such as intentionally mixing and placing equal value on the knowledge derived from lived experience and interpretations of the participants and experience and knowledge derived from experimental manipulation of observed and measured behaviors. I adopted this format in this study.

Chapter 3

Methods

Overview of the Study

The purpose of this study was to engage with an AAC team for a single child with intellectual disability and complex communication needs (CCN) who used AAC to address the following research question:

> In what ways and to what extent was a supports package for a child's educational team effective in supporting (a) the experience and functioning of the team around AAC, (b) competence in AAC instruction, and (c) the child's communication skills?

To address this research question, I employed two different research methodologies, case study and single-case design, and mixed these methodologies to better understand the phenomena of interest. A single AAC team received two interventions as part of the supports package. Intervention 1 was a structured team meeting using a scripted agenda that supported team functioning and planning for AAC implementation. Intervention 2 was one-on-one coaching in the use of three instructional strategies during typically occurring routines with the child provided to each AAC Facilitator on the team (i.e., the team members who had clear and consistent daily interaction with the child and direct responsibility for implementing AAC instruction; Beukelman & Mirenda, 2013). Before, during, and after these interventions, I conducted a case study, engaging in frequent observation of the Facilitators as they interacted with the child in their regular routines, interviewing the Facilitators and other team members about their experiences, and collecting self-reports about their interactions and experiences with the child and with the AAC system (Stake, 1995; Yin, 2013). I also conducted a single-case design (Kazdin, 2011) examination of the effects of the interventions on AAC instruction. The information, analysis, and interpretations throughout this study were mixed to address the research question (Greene, 2007), and I use footnotes throughout to identify data sources that

support information and claims detailed in this report. The Institutional Review Board of the University of Illinois approved this study (see Appendix A) and Appendix B details the timeline of study activities.

In the coming sections, I first describe the participants for this study, then the data sources collected and mixed across methods, the data analysis methods for the single-case study and the case study, and, finally, the methods used for mixing these methodologies to answer the research question.

Participants

I recruited one child with intellectual disability and CCN and members of his educational team who met the inclusion criteria for this study.

Inclusion criteria. To participate, a child and at least five members of his or her educational team had to agree to participate. To qualify for the study, the child was required to have intellectual disability and CCN, be between the age of 3 and 12 years, use aided AAC in English, and receive public school services. The child was required to be eligible for special education services under the educational category of intellectual disability (or commensurate names; e.g., cognitive impairment) or other categories under which intellectual disability is included for the child (e.g., multiple disabilities, other health impairment). The child must already have had access to some form of aided, symbolic AAC (e.g., picture symbols, speech generating device) and not be using unaided systems (e.g., signs, sign language) as the sole form of AAC. To participate in this study, the child must score in or below the first percentile in the section "Words Produced" on the Words and Gestures form of the *MacArthur-Bates Communication Development Inventories* (MB-CDI; Fenson, Marchman, Thal, Dale, Reznick, & Bates, 2006), and the child's Total Language Score must be below the 10th percentile on the

Preschool Language Scales, 5th Edition (PLS-5; Zimmerman, Steiner, & Pond, 2011). The purposes of these inclusion criteria were to ensure that the child recruited had complex communication needs, had already completed the initial evaluation for AAC, and that his/her team had already made the decision to provide aided AAC to the child.

Inclusion criteria for members of the child's educational team that participated included: (a) at least one parent/guardian, (b) the speech-language pathologist (SLP) from the school, (c) the child's special education teacher, and (d) any two additional members from any discipline or role in the child's life (e.g., second parent, sibling, therapist, paraprofessional, general education teacher, babysitter) who is at least 18 years of age and has contact with the child for at least two consistent 10-minute routines, one of which occurs daily. (The SLP is unlikely to see the child daily, but, as an integral member of the AAC team, must agree to participate.)

At least five team members must have agreed to participate in all aspects of the study for the child and his team to be selected as participants. Additional team members could agree to participate in Intervention 1 without receiving coaching (Intervention 2). I established these inclusion criteria to ensure high quality research in which the participants represent the population of interest (Brantlinger, Jimenez, Klingner, Pagach, & Richardson, 2005; i.e., children with intellectual disability and CCN who use AAC and are receiving school services and their educational teams) and to ensure that sufficient information is available to provide a description of the participants that allows readers to identify individuals with similar characteristics and to replicate the conditions of this study to contribute to conclusions about the generality of effects (Horner et al., 2005).

Recruitment. With approval from the administrators of the local school districts, I first attempted to recruit participants through personal contacts by emailing parents, teachers, and

SLPs to tell them about this study and ask if they know of anyone who may be interested in participating. Two different contacts expressed interest in participating and one child and his team met all criteria and agreed to participate.

Participants. The study participants, all represented by pseudonyms, are described here.

Child. The child who participated, Eli, was aged 5 years and 5 months at the beginning of the study and had access to an aided AAC system in English. He was receiving public school services, transitioning into Kindergarten from an early childhood program. Eli was eligible for special education services under the educational category of *other health impairment*,[1] having been diagnosed with Angelman Syndrome and a seizure disorder.[2] Before the study began, Eli's parents, Boris and Nina, had already acquired an aided AAC system for Eli, described subsequently. Eli met all recruitment criteria, having already completed the initial evaluation for AAC and his team having already made the decision to provide him with aided AAC. Results from evaluating his communication skills are described subsequently.

Eli was the youngest of four children and his parents were married with an annual household income of over $100,000.[3] His parents, Boris and Nina, immigrated to the United States from Russia when their oldest child was 3 years old. They spoke both English and Russian at home, their other three children were conversant in Russian, and Nina reported that Eli seemed to understand both languages.[4] Boris and Nina had decided to focus on teaching Eli to communicate in English. Nina explained,

> We are a bilingual family. I really believe that for Eli it would be nice, for now, to stick to English. But we can't change the dynamics of our family completely, so when I model

[1] Eli's initial Individualized Education Program (IEP).
[2] Eli's final IEP; Nina Initial Interview, p. 1 and 2.
[3] Family Demographic Form.
[4] Nina's Initial Interview, p. 11.

> to him, I model 99% in English. Because the [AAC] system and school, everything speaks English so he needs to understand it for his future life and functioning in society.[5]

Boris was a medical doctor at the local hospital, and Nina had experience as an early childhood teacher and a program director of a non-profit but was a homemaker during the study. Eli had an older sister, aged 24, who was away at medical school and twin brothers, aged 15, who lived with Eli and his parents in a small urban community in the Midwest.

*Evaluating child's communication***.** To evaluate the Eli's language and AAC skills, I used formal communication evaluations at the beginning and at the end of the study. These assessments were used in addition to the other measures to describe the child's language skills at these two time points, and were completed prior to Intervention 1 to ensure that Eli qualified for participation in the study.

The *MacArthur-Bates Communication Development Inventories* (MB-CDI; Fenson, Marchman, Thal, Dale, Reznick, & Bates, 2006) is a standardized, parent-completed assessment that screens children's emerging language and communication skills. Although normed to children between the ages of 8 and 37 months, the MB-CDI has been approved for use with older children who have developmental delays (Fenson et al., 2006), and was therefore administered. Forms are available for assessing the child's: (a) use of words and gestures, (b) use of words and sentences, or (c) expressive vocabulary and grammar skills (Fenson et al., 2006). I selected the Words and Gestures form, as it was most appropriate for Eli, based on his SLP's recommendation. The MB-CDI form typically takes 20-40 minutes for parents to complete and has been normed on approximately 1800 children who were typically developing, demonstrating reliability and validity (Fenson et al., 2006). Eli's score in Words Produced was 0 at the beginning of the study and remained at 0 at the end of the study.

[5] Nina's Initial Interview, p.11.

The *Preschool Language Scales, 5th Edition* (PLS-5; Zimmerman, Steiner, & Pond, 2011) is a comprehensive developmental language assessment that is reliable for children birth to age 7 years, 11 months who have severe and persistent language deficits. It was administered by the SLP who participated in the study at the beginning of the study and six months later, after the study has ended. The PLS-5 assesses receptive and/or expressive communication in nine areas: (a) attention, (b) play, (c) gesture, (d) vocal development, (e) social communication, (f) semantics, (g) language structure, (h) integrative language skills, and (i) emergent literacy skills. The PLS-5 takes approximately 45-60 minutes to administer, and the post-study evaluation occurred six months after the initial assessment, per PLS-5 guidelines. The assessment has been rigorously analyzed using a representative sample of 1400 children in the United States, with split half reliabilities ranging from .80 to .97 and adequate sensitivity (.83) and specificity (.80) of the Total Language Score. Eli's total language standard score was 50 (1st percentile) at the beginning and end of the study.

*Child's AAC system***.** Eli's mother had selected and acquired the PODD with Compass speech-generating app on an iPad mini as Eli's AAC system, shown in Figure 5, directly accessing the system by touching the screen with his fingers. PODD is the acronym for Pragmatic Organization Dynamic Display, an AAC system originally designed as a picture symbol communication book (Porter & Cafiero, 2009). Eli had originally started with this low-tech communication book and acquired the high-tech app in November of 2014.[6] A detailed description of this system is available in Appendix C.

[6] Nina's Initial Interview, p. 6.

Figure 5. Eli's AAC system. On the left, Eli's iPad mini with PODD for Compass app home page with keyguard and iAdapter case. On the right, Eli wearing the harness and his AAC system.

Child's educational team. Five core members of Eli's educational team who met the inclusion criteria agreed to participate, providing informed consent for all study activities, and two additional team members provided informed consent to participate in Intervention 1 only. These five AAC Facilitators who participated in all study components included: (a) Eli's mother, Nina; (b) the school speech-language pathologist, Clair; (c) Eli's special education teacher, Elsa; and (d) two paraprofessionals who worked with Eli at school, Lizzy and Jane. Eli's father, Boris, and the certified occupational therapy assistant (COTA) from the school, Elaine, participated in Intervention 1.

The school staff that participated in this study were just beginning their work with Eli at the beginning of this study, as he was transitioning from early childhood into Kindergarten. Jane had been a substitute in his early childhood classroom on occasion the previous year and had met Eli on those occasions, and Elaine, the COTA, had been a member of Eli's educational team for 2.5 years. All other members met Eli at the beginning of the school year, just a few weeks before this study began.

Each adult participant was asked to complete a short demographic form at the beginning of the study, presented in Appendix D. The participating parents completed a form to describe their family, including themselves and the participating child, also in Appendix D. This information is summarized in Table 3.

Table 3

Study Participants

Participant	Pseudonym	Study participation	Race/ Ethnicity	Age	Education
Mother	Nina	All	White	36-45	Bachelor's
SLP	Clair	All but Intervention 2 and corresponding interview	White	25-35	Master's
Special education teacher	Elsa	All	White	25-35	Bachelor's
Paraprofessional	Lizzy	All	White	46-55	Associate's
Paraprofessional	Jane	All	White	36-45	Bachelor's
Father	Boris	Intervention 1	White	46-55	Medical Doctor
COTA	Elaine	Intervention 1, interview	White	36-45	Associate's

Note. SLP is speech-language pathologist; COTA is certified occupational therapy assistant.

Eli's educational services. I identified the educational services Eli received in two ways. First, I reviewed the child's Individualized Education Program (IEP) to identify the services included and the number of minutes per week designated for each service. As this document is the legal delineation of a child's educational services, it represents a meaningful and relevant document (Brantlinger et al., 2005). Second, I asked members of Eli's educational team to describe his typical school day during interviews (see subsequent section) and integrated this information with the information provided on the IEP to better capture how services are delivered. Finally, I identified any additional services Eli received outside of school (e.g., private therapy) using the parent report on the demographic form (Appendix D).

At the beginning of the study, Eli's IEP indicated that he received special education services in the general education Kindergarten classroom for 905 minutes per week. During centers, calendar, literacy, specials (e.g., music), library, arrival/dismissal, recess, and lunch, Eli received one-on-one paraprofessional support and supports from physical, speech, and occupational therapists. For 940 minutes per week, Eli received special education services outside the general education classroom, focusing on communication, literacy, and functional independence. He also received 30 minutes per week of speech/language services outside the general education setting (with 30 minutes per week inside the general education setting). Eli's mother reported that he did not receive any additional services outside of school, but did participate in adapted swimming lessons at the local YMCA.[7] Both Elsa, Eli's special education teacher, and Clair, his SLP, reported that they were providing services consistent with the IEP. Clair was spending 15-30 minutes of her time with Eli each week doing communication activities with his peers.[8] Using an extra iPad with the PODD with Compass app that Eli's family provided, she would have a peer talk to Eli using AAC while she helped Eli respond and/or modeled responses. This became an important activity for Eli's classmates, as each child in his general education Kindergarten class was introduced to Eli's AAC system, learned how it worked, and learned how to use it to model communication to him and how to do this appropriately. In November, Nina started volunteering at the school on Friday mornings and joining Clair for these sessions.

After the team meeting (Intervention 1) on October 13, 2015, no changes in Eli's services were immediately made and no changes were subsequently made that were directly caused by this meeting. Instead, the team adjusted his schedule and supports based on their own

[7] Family Demographic Form; Nina's Initial Interview, p.10.
[8] Clair Friday observation videos.

professional judgment of his academic, communication, and other support needs and at his family's request. In November, the team decided that Eli could spend more time with his general education peers and adjusted Jane's schedule from taking Eli for a sensory break in a separate room to taking him back to the Kindergarten classroom to participate in the general education activities.[9] This increased his time in the general education classroom by approximately 150 minutes per week.

Eli's IEP annual review and reevaluation for eligibility for education services was held on January 22, 2016.[10] At this meeting, Eli's services were formally adjusted to reflect the changes the team had made, with Eli now spending 1115 minutes per week in the general education setting with special education supports and 670 minutes per week in the special education classroom. He continued to receive occupational and speech therapy services, but physical therapy services were discontinued because he no longer needed these supports. These changes were reflective of the services Eli was receiving at the end of the study.

Data Sources

Four major sources of data were collected and mixed to inform both the case study and single-case design study. Here, I describe these sources, which are also detailed in Table 4. To create an audit trail to demonstrate the extent to which I engaged with the case (Brantlinger et al., 2005) and to ensure data are available for an audit check for confirmability or dependability, all data sources were captured in electronic formats and stored in a secure folder on Box, a University-provided cloud file storage service.

[9] Jane observation video 11/18/15; Team meeting notes 11/17/15; Field notes 11/17/15.
[10] Eli's Final IEP.

Table 4

Data Sources Collected

Data source	Participant				
	Nina – Mother	Elsa – SpEd teacher	Lizzy – Paraprofessional	Jane – Paraprofessional	Clair – SLP
Documents & artifacts	1.2 GB across all participants and study conditions				
Interviews	4	4	4	4	3
Self-report logs (of 20 opportunities)	19	11	15	18	13
Observation videos	117	91	95	92	38
Initial observations	IR: 8 GR: 3	IR: 8 GR: 0	IR: 5 GR: 1	IR: 4 GR: 2	5
Baseline	IR: 12 GR: 3	IR: 12 GR: 1	IR: 8 GR: 2	IR: 12 GR: 2	4
Post-intervention 1 (Team Meeting)	IR: 14 GR: 3	IR: 20 GR: 6	IR: 26 GR: 5	IR1: 15 IR2: 13 GR: 10	29
Coaching sessions	8	5	5	7	NA
Coaching probes	IR: 6 GR: 2	IR: 0 GR: 1	IR: 4 GR: 1	IR2: 10 GR: 3	NA
Maintenance	IR: 52 GR: 6	IR: 38 GR: 0	IR: 30 GR: 8	IR2: 10 GR: 4	NA

Note. SpEd is Special Education; SLP is Speech-Language Pathologist; IR is Intervention Routine; GR is Generalization Routine

Documentation and artifacts. I reviewed documentation and artifacts to create a thorough description of the educational services and the AAC system that Eli was using and the experience of the participants across the case study. These sources included his Individualized Education Program (IEP), meeting notes from team meetings held during the study, field notes of observations and interactions with participants, text messages and social media posts from adults, emails, and photographs. These data were used throughout the data analysis process and are identified in footnotes throughout this report.

Interviews. In addition to informal conversations that occurred throughout the study activities and were documented in the aforementioned field notes, I interviewed adult participants four times across the duration of the study: (a) at the beginning of the study, (b) after participating in the team meetings for Intervention 1, (c) immediately after receiving coaching in Intervention 2, and (d) at the end of the study. For school employees, these interviews sometimes took place outside of their contracted time, although some were scheduled during their lunch hours or preparation periods. Clair, the SLP, did not participate in the post-Intervention 2 interview, as she did not receive this coaching. The additional adults that participated in Intervention 1 but not Intervention 2 (i.e., Boris and Elaine) were invited to participate in one interview after the team meeting; only Elaine participated.

The initial semi-structured interview protocol was developed from a literature review and aligned with quality indicators for qualitative research in special education (Brantlinger et al., 2005) to address (a) knowledge about the current AAC system and intervention plan, (b) the extent to which the interviewee agrees with and is invested in this plan, (c) supports and barriers to supporting AAC for Eli, and (d) her experiences as a member of Eli's team (see Appendix E). The final three interviews addressed the same content using questions tailored to characteristics of this particular case from initial interview results and the other measures employed throughout this study and also addressed issues inherent in the social validity of the goals, procedures, and outcomes of each intervention; see the Plan for Mixing section of this chapter for a description of how subsequent interview protocols were developed (see Appendix E for protocols). The initial and final interviews lasted between one and two hours and the post-intervention interviews lasted between 20 minutes and one hour. I conducted these interviews at locations and times

determined by the interviewee. All interviews were audio recorded and transcribed for use during data analysis.

Weekly self-report logs. I asked the team members to complete a weekly self-report log detailing their interactions with Eli and his AAC system (see Appendix F). The self-report log was hosted online using Google Forms. I sent an email reminder each Thursday evening, asking them to complete the form on Friday and including a link to the form. The log asked the adults to report about (a) one day each week in which they felt the best about how Eli did with the AAC system, including questions about the skills taught in Interventions 1 and 2, the maintenance tasks the participants engaged in around the AAC system (e.g., charging the device), and Eli's use of the AAC system; (b) the week overall, using the same questions from the previous section, and (c) the team's functioning and their work with Eli during the week. Throughout the log, they were given opportunities to comment about their experiences. Their open-ended comments were compiled into documents representing different phases of the study (i.e., before supports, after Intervention 1, during Intervention 2, after Intervention 2) and used throughout data analysis. Their responses on the remaining questions were compiled in Microsoft Excel spreadsheets, represented in charts and graphs, and used throughout data analysis.

Observations. I observed, via video recording, each participant's interaction with Eli during two typical and regularly occurring routines. To do this, I asked each AAC Facilitator to identify two routines in which they engaged with Eli on a regular basis that typically lasted at least 10 minutes and that they could video record without capturing other children. I then asked them to identify which of these two routines occurred most frequently; this routine was considered the Intervention Routine and the other the Generalization Routine for the single-case study (see subsequent section) but both routines were used for case study observation purposes. I

asked the participants to video record the Intervention Routine each time it occurred and the Generalization Routine one time each week throughout the study (see Appendix C for a rationale of video frequency). Clair was asked to record all of her sessions with Eli, as she only saw him on Mondays, Wednesdays, and Fridays.

At the beginning of the study, I helped each participant record their first several Intervention and Generalization Routines until they felt comfortable with the process. I provided small, flexible tripods to facilitate recording (see http://joby.com/gorillapod). Nina and Clair recorded videos on their personal phones and uploaded the videos to Box. Elsa, Lizzy, and Jane recorded on an iPhone 3S I provided, and, each day, I picked up the iPhone, uploaded the videos to Box, deleted the files from the phone, and returned the phone to the school the following day for new recordings.

The study encompassed 103 school days from September 2015 through February 2016, and the number of videos submitted by each Facilitator is denoted in Table 4. All Facilitators completed all possible daily video recordings, only failing to submit an Intervention Routine video on days when they did not see Eli. All team members were less consistent in submitting videos of their Generalization Routine.

Single-Case Design

I employed a multiple baseline across participants single-case design to contribute to addressing the research question. Single-case designs are a method for demonstrating experimental control with a single case (Kazdin, 2011). Here, the case was defined as the AAC Facilitators and the child who was using AAC, as previously described. The Facilitators received two interventions (i.e., independent variables) that addressed two critical components of AAC service delivery: (a) team functioning and planning around AAC and (b) competent

implementation of evidence-based AAC instruction with the child. The team engaged in the first intervention approximately one month after the study began on October 15, 2015. The second intervention was then delivered to each team member individually, with each person beginning after another had mastered its contents (multiple baseline across participants). Nina began Intervention 2 on November 5, 2015, three weeks after Intervention 1. I completed Intervention 2 with the final participant on February 4, 2016, three months later (see Appendix B. The independent variable for the single-case study revolved around the application of Intervention 2.

In this section, I first describe the settings, baseline conditions, and the two independent variables, including the materials, procedures and fidelity measures unique to each intervention, and the generalization/maintenance procedures. Then, I describe the dependent variables, including interobserver agreement. I close with a description of how I analyzed these data.

Settings. Each Facilitator recorded herself in two routines with the child as part of the study (see Observation section earlier in this chapter). The Intervention Routines they recorded were typical routines they did with Eli on a daily basis and that typically lasted at least 10 minutes. All observations for single-case design purposes occurred during this Intervention Routine in its natural setting as many times as possible each week, beginning 12 days prior to Intervention 1 to ensure that at least five observations are collected in baseline conditions for each participant and establish a stable baseline data pattern (Horner et al., 2005; Kratochwill et al., 2010).

Facilitators also recorded a Generalization Routine that they did with Eli at least once per week and that typically lasted at least 10 minutes. These Generalization Routines were used in the single-case study as probes for generalization of the use of the instructional strategies to new routines in which the adult did not received coaching (Kazdin, 2011; see Generalization section).

Because Clair, the SLP, did not see Eli every day, I asked her to video record all her interactions with Eli each week and invited her to participate in coaching with other participants, but she was not included in the single-case design study. Table 5 presents the routines each participant selected and recorded throughout the study.

Table 5

Settings for Each Study Participant

Participant	Intervention routine	Generalization routine
Nina - Mother	Mealtime	Playtime
Elsa - Special Education Teacher	Discrete trial teaching (DTT) - special education classroom	Group lesson - special education classroom
Lizzy - Paraprofessional	Pivotal response training (PRT) - special education	Art - general education art classroom with peers
Jane - Paraprofessional	1.Sensory break - private room 2.Centers - general education	Calendar - general education classroom
Clair - SLP	Recorded all sessions (typically Monday, Wednesday, and Friday mornings for 15-30 minutes)	

Note. Because of changes to Eli's schedule, Jane's Intervention Routine changed in November.

Baseline. At the beginning of the study, the AAC Facilitators engaged in and video recorded the Intervention and Generalization routines without receiving any instruction or intervention from me. A randomly selected 5-minute portion of each recording was coded to measure the dependent variables for this study, described subsequently. When each Facilitator had recorded at least five occurrences of the Intervention Routines and one occurrence of the Generalization Routine, and when there was a stable data with the primary dependent variable across all four Facilitators, the first independent variable was introduced (i.e., Intervention 1).

Independent variables. There were two independent variables, delivered sequentially as a supports package to the adult participants in this study, with Intervention 2 being delivered using multiple baseline design logic.

Intervention 1. The purpose of Intervention 1 was for all team members to develop knowledge about and consensus around the AAC system, vocabulary, goals, and implementation plan for the child. The intervention was videotaped and delivered in an approximately two-hour, face-to-face meeting with the team. Eli's family invited the team to their home for this meeting, and all school team members indicated that this location was sufficiently accessible, convenient, and comfortable. For school employees, this meeting took place outside of contracted time. I facilitated this meeting by arranging the location, identifying a time where all participating team members could be present, and providing a detailed agenda for the team to follow, the Team Forming Meeting agenda presented in Appendix G. A description of how this was developed is presented in Appendix H.

On October 15, 2015, the team meeting was held. I opened the meeting by stating the purpose for gathering, asking all attendees to introduce themselves, and explaining how the agenda should be used. Then, I asked the team to identify a leader and a timekeeper and turned the meeting over to the team. I allowed them to work through the agenda independently, only observing the interaction and providing training on the three instructional strategies during that portion of the meeting. I chose to do this so that I could collect data about how the team functions and how the agenda was used by the team without the researcher's ongoing direction.

The meeting had six components: (a) Introductions, (b) Building the Foundation, (c) Specifying the Goal, (d) What's Already in Place, (e) What Needs to Be in Place, and (f) Committing to the Plan. The contents of these sections are detailed in Appendix G and reflect the literature reviewed in Chapter 2. During the "What Needs to Be in Place" portion of the meeting, I provided the demonstration video clips used and provided a brief overview of the strategies that were to be targeted during Intervention 2. This portion of the meeting served as training on how

to use each strategy targeted for coaching in Intervention 2 (i.e., aided AAC modeling, creating opportunities, most-to-least systematic prompting procedure).

Fidelity of implementation for team meeting. I assessed fidelity of implementation for the team meeting (Intervention 1) on two levels. First, I completed a fidelity checklist during the team meeting. Second, a second observer, a graduate student in special education who was naïve to the study purpose or conditions, watched the video recording of the team meeting and completed the same fidelity checklist (i.e., a reliability check). Fidelity of implementation was assessed at 84% (46 of 55 steps completed) by the primary observer and at 80% (44 of 55 steps) by the secondary observer. I calculated the point-by-point agreement by counting the number of agreements, dividing that by the number of disagreements and multiplying that by 100. The point-by-point agreement between the two observers was 96.4%.

Intervention 2. The purpose of Intervention 2 was to support four Facilitators in learning how to use three evidence-based instructional strategies that support AAC skill development and to successfully implement those strategies in their interactions with Eli. During their respective Intervention Routines, each participant received one-on-one coaching in the use of three strategies: (a) aided AAC modeling, (b) creating opportunities via naturalistic developmental behavioral strategies, and (c) most-to-least systematic prompting. For school employees, coaching sessions took place within the school day during their contracted time.

The first two strategies were defined in Chapter 2 and all strategies are defined in the Coding Manual in Appendix J. In collaboration with Eli's mother, SLP, and special education teacher, we determined that, of the possible evidence-based systematic prompting procedures available, most-to-least systematic prompting was most appropriate for Eli. This decision was also informed and support by the analysis of case study measures (see subsequent Plan for

Mixing section). We used the procedures set forth by Snell and Brown (2011). That is, the adults provided Eli with the most helpful or intrusive prompt (i.e., full physical assistance) to use his AAC system and worked toward fading the helpfulness/intrusiveness of that prompt over time (e.g., move to partial physical assistance). The same prompting system and prompt hierarchy was used across all adults and routines to facilitate consistency for Eli and encourage rapid and consistent skill development.

The coaching sessions were delivered to one team member for a minimum of five coaching sessions until she reached performance criteria for the primary dependent variable. This performance criterion was developed based on the performance observed during baseline and post-Intervention 1 phases and was that the adult completed at least 80% of their use of most-to-least prompting with high fidelity for three consecutive observations and self-reported feeling confident in using all three strategies during the coaching session (see Appendix J for coaching session protocol). Coaching was introduced to the next participant after the prior participant reached the performance criteria. Coaching sessions began with the first participant 14 days after Intervention 1 to ensure that at least five observations were collected in the post-Intervention 1 study condition for each participant and that a stable or decreasing trend across the target dependent variable for at least three Facilitators was established (Horner et al., 2005; Kratochwill et al., 2010). Nina, Eli's mother, receive coaching first and the special education teacher determined the order in which the other participants received coaching. No other team members were present during another's coaching sessions.

Each coaching session lasted at least 10 minutes and consisted of three phases: (a) a short pre-observation conference, (b) observation, and (c) reflection and feedback in a post-observation conference. The procedures for each coaching session are presented in Appendix J

and all coaching sessions followed the same approximate format. However, some variation in format was necessary to accommodate for the varying contexts in which the Facilitators were working with Eli. For example, Lizzy's Intervention Routine with Eli was scheduled for a 15-minute block in her schedule and she was responsible for another child immediately afterward. Given this short time frame, we often discussed her strategy use during her interactions with Eli rather than waiting until after their routine was finished. Because of this necessary variation, I used the five key features of coaching, as identified in Chapter 2, in the fidelity checklist for the coaching, namely: (a) joint planning, (b) observation, (c) coachee reflection, (d) supportive feedback, and (e) corrective feedback. I acted as the coach for all participants.

Typically, in the pre-observation conference, the coach and Facilitator engaged in joint planning by discussing at least one of the target strategies, the vocabulary they were targeting with Eli, and/or other action steps they needed to take to use the strategies with Eli (e.g., adjust their physical proximity to Eli, introduce new materials to increase Eli's interest). At least twice, the coach gave the Facilitator video feedback using a short clip from the Facilitator's previous interactions with Eli, and the coach reviewed graphs of performance data at least once during coaching with Nina and Elsa. To do this, the coach identified instances of the target strategies in the clip and provided supportive and/or corrective feedback on how the Facilitator used the strategies. After this short conversation, the coach observed the Facilitator and the child interacting in their routine, taking notes about the Facilitator's use of the strategies. After the Facilitator-child interaction ended, the Facilitator and coach briefly discussed the session. The coach asked the Facilitator to reflect on her use of the strategies and then provided both supportive and corrective feedback about strategy use. A detailed description of the coaching session features and activities for each participant is available in Appendix J.

Fidelity of implementation for coaching sessions. I measured the extent to which I, as the coach, adhered to the coaching procedures using a checklist available in Appendix J. The procedures required that the five key features of coaching be addressed in each session, allowing the activities within these features to vary based on participant need and schedule. I assessed procedural fidelity for all sessions, completing the checklist during the coaching session and reviewing the video recording of the session to verify my ratings. Procedural fidelity was assessed at 100% across all sessions for Nina and Elsa. For both Lizzy and Jane, one feature was omitted during one coaching session, representing a fidelity score of 96% for Lizzy and 97% for Jane. A second observer, an undergraduate student in speech and hearing science, was trained in the procedural fidelity checklist and then observed at least 30% of the coaching sessions for each participant (i.e., a reliability check). She assessed procedural fidelity at 100% for Nina, Elsa, and Jane and 90% for Lizzy. I calculated point-by-point agreement by counting the number of agreements across all four participants, dividing that by the number of disagreements and multiplying that by 100. The point-by-point agreement between the two observers was 98.0%.

Generalization and maintenance procedures. For this supports package to be considered effective, it was preferable that the adults generalized the instructional skills they learned to other interactions with Eli without requiring the same level of support to apply the strategies. Thus, the participants never received coaching during their Generalization Routines and I recorded the dependent variables in their Generalization Routines to examine the extent to which participants generalized the target behaviors. I coded randomly selected 5-minute segments of each video recording of their Generalization Routines throughout the single-case study using the same measures and procedures used with the Intervention Routines.

I measured maintenance of the target behaviors after both interventions had ended in two ways. First, all observations continued immediately after the final coaching session of Intervention 2 with each participant until all participants had received coaching. During this period, I provided feedback to Elsa about her use of the three strategies on three occasions (1/11, 1/12, and 2/3) and to Lizzy on one occasion (1/11) per their request. After the final participant, Jane, had received coaching, 14 more daily observations were collected from each participant (see Appendix B for timeline). During this period, I provided feedback to Nina about her use of the three strategies on one occasion (2/18) per her request.

Dependent variables. All observations were video recorded and a randomly selected 5-minute portion of each was coded for one primary dependent variable that was used to make decisions for transitioning from one phase to the next and five additional dependent variables. The primary dependent variable was the Facilitators' percent of high-fidelity prompting procedure use. We also coded three additional dependent variables of Facilitator behavior: the rate at which each Facilitator (a) modeled using the AAC system, (b) created opportunities for the child to use AAC, and (c) prompted the child to use AAC. In addition, the recordings were coded for two dependent variables of child behavior: (a) percent of independent responses with AAC to adult strategy use, and (b) rate of independent initiations with AAC. Each of these dependent variables were operationally defined and subjected to procedures to establish reliability through interobserver agreement (see subsequent section) in keeping with quality indicators in single-case research (Horner et al., 2005; Kratochwill et al., 2010). The operational definitions for each are presented in Appendix I. Final definitions and coding rules were developed using video collected during the first week of the case study (i.e., prior to the start of

the baseline phase of the single-case study). The operational definitions are briefly described subsequently and are objective, clear, and complete (Kazdin, 2011, p. 58).

Percent of high-fidelity prompting procedure use. Each observation was coded to identify the percent of high-fidelity most-to-least prompting procedure use to measure each adult's mastery of that instructional skill. To complete this procedure correctly, the adult had to complete four steps: (1) interrupt Eli's nonysmbolic communicative behavior with a prompt from his prompt hierarchy (i.e., full physical assistance [FPA] → partial physical assistance [PPA] → guide from elbow [Elbow] → point to the device [PP] → Independent [I]), (2) use the correct prompt without speaking to Eli to help him deliver a message that corresponded to his behavior via his AAC device, (3) interrupt any errors Eli made with full physical assistance, and (4) give both verbal and consequence feedback after Eli delivered his message. The team identified five existing communicative behaviors that Eli regularly engaged in and the vocabulary item they would teach him to replace those behaviors. These are shown in Table 6. For example, when Eli reached for more pancakes, his mother would (1) interrupt that reach with (2) partial physical assistance but not speak or acknowledge him otherwise while prompting him to touch "Chat Words → more" on his device, (3) interrupting any mistakes with full physical assistance, and then (4) say, "Oh, more! You want more pancakes! Ok, here you go" (verbal feedback) and give him more pancakes (consequence feedback). When the adult prompted Eli, the observer gave her one point for each of the four steps completed, resulting in a score between 1 and 4 for each instance of prompting. The number of 4s (i.e., high fidelity) was summed and divided by the total number of prompting events in the session and multiplied by 100 to determine the percentage of high-fidelity prompting use in each session. The coding scheme is available in Appendix I.

Table 6

Eli's communicative behaviors and corresponding vocabulary

Eli's behavior	Corresponding word	Steps on PODD
Wave/approach/track person across the room	"Hello" or "Goodbye"	Greetings → Hello/Goodbye (2-hit)
Hand-leading	"Let's go"	On home page (1-hit)
Pushing/leaving/rejecting	"Done"	Chat Words → Done (2-hit)
Handing things to you	"Help"	Chat Words → Help (2-hit)
Reaching	More	Chat Words → More (2-hit)

Note. Steps on PODD represents what symbols had to be touched in the PODD with Compass app on the iPad to produce the corresponding word.

Rate of aided AAC modeling. The operational definition of this variable was an adult completing the following two steps when speaking to Eli: (a) activating at least one symbol on the AAC system (Eli used a voice output system, so his device provided the spoken label for the activated word) and (b) providing a spoken expanded model that uses at least one additional word (Binger & Light, 2007). For example, during lunch, the adult might have said, "I like pizza." and touched the symbol on the AAC system that corresponded with the underlined word. We coded each observation to identify the rate at which the adult provides aided AAC models, counting the total number of models given and dividing this by the length of the video clip (see Coding Manual in Appendix I).

Rate of opportunities created. Each observation was coded to identify the rate at which the adult created an opportunity for Eli to communicate via his AAC system by using naturalistic developmental behavioral strategies (Schreibman et al., 2015). To create an opportunity, the adults were taught to use one of two naturalistic developmental behavioral strategies: (a) environmental arrangement, or (b) mand-model (see Coding Manual in Appendix D). To use environmental arrangement, the adult had to establish joint attention (e.g., both adult and Eli are

looking at the same toy), ensure Eli had to communicate to get what he wanted and the AAC system was accessible to him (i.e., environmental arrangement), and wait at least three seconds while looking expectantly at Eli before saying something to the child (i.e., time delay). To use the mand-model strategy, the adult had to establish joint attention, provide a mand (i.e., ask a question, give a choice, or give a direction), and wait at least three seconds while looking expectantly at Eli (i.e., response latency). For example, the adult might have placed Eli's snack in a sealed clear bag on the table. When he looked at the bag and reached for it, the adult looked at the bag and then looked at the child expectantly. The adult might have said nothing for three to five seconds or asked, "What do you want?" (mand) and waited three to five seconds.

Rate of prompting. Each observation was coded to identify the rate at which the adult prompted Eli to communicate via his AAC system by delivering any of the prompts identified in his prompt hierarchy (i.e., FPA→PPA→Elbow→PP). We calculated the rate of all prompting use, regardless of the fidelity score (see Coding Manual in Appendix I).

Child's percent of independent responses with AAC to adult strategy use. Each time an adult used one of the three strategies (i.e., aided AAC modeling, creating opportunities, most-to-least prompting) during an observation, Eli's response was coded as either (a) response with AAC or (b) no response with AAC. Then, the observer coded the topography of his response using the following codes: (a) independent with AAC—correct; (b) independent AAC babbling; (c) AAC with point prompt, (d) AAC with elbow prompt, (e) AAC with partial physical assistance (PPA); (f) AAC with full physical assistance (FPA); (g) nonsymbolic behavior, or (h) none. These topographies are defined in the coding manual in Appendix I. We counted the number of times Eli's communication behavior was coded as "response with AAC" with "independent with AAC—correct" or "independent AAC babbling." The purpose of these two

codes was to differentiate between Eli's intentional use of the device to produce a specific message and the many other ways in which he might independently deliver a message via his device without that level of intentionality. For example, because he used a touchscreen, he might independently activate a message on his device by placing his hand indiscriminately on the screen. Although this would result in him saying something via AAC, he had not intentionally selected the message spoken. Such instances were coded as "independent AAC babbling."

We divided this by the sum of events of aided AAC modeling, creating opportunities, and prompting (i.e., adult strategy use) and multiplied it by 100 to identify the percent of independent responses with AAC Eli had in each session. These criteria meant that if Eli used his AAC device to say anything independently, it was included in this score, even if he delivered an off-topic, inaccurate, or unintentional response.

Child's rate of independent initiations with AAC. If Eli used his AAC device to initiate communication with another person (defined as independent use of the device with at least 5 seconds of silence preceding his message), this was coded as an "initiation with AAC." For each session, the number of initiations with AAC was counted and divided by the number of minutes observed to determine the rate per minute of initiations.

Interobserver agreement. To establish the reliability of these measures, I assessed interobserver agreement (IOA) for all coded data. Two different people were assigned to observe and code the data for each participant. I coded all data and acted as the primary observer for Nina, Elsa, and Lizzy, and the graduate assistant coded all data and acted as the primary observer for Jane and Clair (although Clair's data was not included in the single-case design). A second observer observed and coded at least 30% of the sessions, selected at random, for each participant in each condition of the study (i.e., baseline; post-Intervention 1; Intervention 2;

generalization probes; maintenance). The graduate assistant acted as the secondary observer for Nina, and two undergraduate students in speech and hearing science who were naïve to the study conditions, acted as the secondary observers for Elsa, Lizzy, and Jane. The observers practiced together all coding procedures. Then, observers independently coded observation sessions using the developed definitions, the secondary observer's data were compared to the primary coder's results and the observers discussed any disagreements. This process was repeated until the two observers reached at least 80% reliability on each code category; the sessions used for training were omitted from the reliability scores. After establishing agreement, the secondary coders were assigned randomly selected sessions.

Agreement was defined as both observers identifying the timestamp of the occurrence of a dependent variable and coding each of the dependent variable categories in the same way (see Appendix I for coding manual with example data collection sheet). Time stamps for events could vary by up to 3 seconds and fidelity of prompting scores were assessed for agreement based on if the two raters agreed on if the participant received a 4 or not (i.e., disagreements between a score of 2 and 3 were not counted as disagreements; disagreements between any number and 4 were counted as disagreements). IOA was calculated for each coding category as agreements divided by agreements plus disagreements and multiplied by 100. These scores are presented in Table 7.

Table 7

Interobserver Agreement (IOA) by Facilitator and Phase

Facilitator	Phase (*n,* % of sessions coded)	Average Percent of IOA of coded categories (range) Time stamp	Strategy	Prompting fidelity score	Child's behavior	Child's topography
Nina - Mother	Baseline (15, 33%)	82 (72-93)	100 -	100 -	92 (91-93)	91 (86-93)
	Post-Intervention 1 (17, 35%)	82 (70-100)	99 (93-100)	95 (83-100)	98 (91-100)	93 (87-100)
	Intervention 2 (17, 35%)	80 (71-92)	100 -	96 (88-100)	100 -	93 (88-100)
	Maintenance (18, 31%)	86 (43-100)	99.7 (94-100)	93 (76-100)	98 (87-100)	93 (66-100)
Elsa - Special Education Teacher	Baseline (13, 39%	81 (50-100)	97 (80-100)	97 (80-100)	87 (60-100)	87 (75-100)
	Post-Intervention 1 (27, 33%)	78 (60-100)	99 (86-100)	97 (86-100)	99 (80-100)	87 (75-100)
	Intervention 2 (6, 67%)	79 (53-88)	100 -	95 (86-100)	95 (86-100)	88 (79-100)
	Maintenance (13, 34%)	78 (46-100)	99 (88-100)	93 (75-100)	93 (75-100)	84 (60-100)
Lizzy - Para-professional	Baseline (5, 50%)	75 (50-100)	100 -	94 (88-100)	100 -	89 (83-100)
	Post-Intervention 1 (11, 33%)	77 (50-100)	99 (88-100)	100 -	94 (67-100)	85 (60-100)
	Intervention 2 (6, 55%)	79 (64-100)	100 -	95 (88-100)	92 (88-100)	84 (67-100)
	Maintenance (12, 32%)	79 (33-100)	93 (60-100)	91 (67-100)	94 (60-100)	94 (83-100)
Jane - Para-professional	Baseline (5, 36%)	81 (50-100)	100 -	100 -	92 (50-100)	85 (50-100)
	Post-Intervention 1 (12, 32%)	82 (67-100)	100 -	100 -	94 (60-100)	86 (50-100)
	Intervention 2 (9, 47%)	77 (50-100)	100 -	95 (75-100)	100 -	95 (75-100)
	Maintenance (5, 36%)	85 (75-100)	100 -	96 (67-100)	100 -	93 (83-100)

Data analysis. I evaluated the data collected for the single-case design study using visual inspection (Kazdin, 2011). To conduct visual inspection, I measured the four dependent variables of adult behavior and two dependent variable of child behavior, described previously. Then, I

graphed their performance data, presenting each dependent variable in a separate graph. To examine the effect of the intervention package on the Facilitators' behavior, I chose high-fidelity use of prompting as the primary dependent variable of the single-case design. While the desirable or ideal rate of aided AAC modeling and creating opportunities is largely unknown (and possibly unknowable), high-fidelity use of systematic prompting is well-established as an important and desired outcome for instructors (Snell & Brown, 2011). Although we considered all graphs of single-case data in the mixed methods evaluation of this intervention package, discussed in Chapter 4, I conducted formal visual analysis on the primary dependent variable only.

To evaluate the effect of the intervention package, I visually inspected the graph of the percentage of high-fidelity prompting use for changes in level, trend, and variability, including analysis of the immediacy of changes in these features after the initiation of the independent variable (Kazdin, 2011; Kennedy, 2005). I conducted a vertical analysis of these changes across participants to establish that the changes in behavior occurred, and only occurred, after the features of the independent variable had been applied, demonstrating control for threats to internal validity from history, maturation, and testing (Gast & Ledford, 2014; Kazdin, 2011). To do this, I visually inspected the graphed data to establish that the performance data were stable across all participants under the baseline conditions. Then, when Intervention 1 had occurred, I analyzed changes in the data patterns described subsequently across all four tiers (each participant's data is graphed in its own tier) of the graph. This was repeated when Intervention 2 had been initiated and under maintenance conditions.

Analyzing child performance data. Although we cannot assume experimental control over the child's communication performance, the changes in adult behavior must correspond to

positive changes in the child's behavior over time for the supports package to be considered effective. Thus, I also graphed Eli's performance data (i.e., percent of responses to adult communication, rate of initiation) and used these graphs to make observations about changes in Eli's AAC performance and inform our mixed methods assessment of the effectiveness of the supports package.

Case Study

As part of the mixed methodologies I employed to address the research question, I conducted an embedded case study of Eli, the participating educational team members, and their activities over the duration of this study, which lasted six months during the school year (i.e., September through February; see Appendix B; Yin, 2013).

Case study is the examination of the particularity and complexity of a single case within important circumstances that produces understanding of the case's activity (Stake, 1995). When multiple units of analysis (here, multiple team members with different roles) exist within a case and are analyzed separately and collectively, Yin (2013) described this as embedded single case study design. For the purposes of this study, the case was defined as the child who uses AAC, the adults with whom the child interacted on a daily basis and/or who engaged with the AAC system, referred to throughout as AAC Facilitators, and any additional adults who acted as members of the child's educational team under IDEA (2004). In answering the research question about the effectiveness of the supports package provided in this study, the purpose of this case study was to contribute to two important characteristics of effectiveness by explaining the participants' (a) perception of the social validity of the interventions they received, and (b) perception of the effects of the interventions on their own and the child's behaviors.

Data analysis. To increase the level of trustworthiness and credibility of analysis, I worked with at least one additional person from a different but related field of study, a graduate student in speech and hearing science, to conduct data analysis for the case study. We used a combination of qualitative analyses to reduce the data sources to their core meanings and then used an explanation building to craft a response to the research question (Patton, 2015; Stake, 2006; Yin, 2014). To ensure a strong foundation for our analysis, we analyzed data throughout the study, even as fieldwork continued, and scheduled intense and dedicated time for doing this work soon after the study conditions changed (Patton, 2015). Here, I describe the methods and processes used to analyze the corpus of data collected across this study, including mixing in the data and conclusions from the single-case study, to explain the team's functioning, their instructional competence, and Eli's communication over time and the social validity of the supports package they received.

Social validity. As previously described, the social validity of the goals, procedures, and outcomes of the supports package I provided to this team is necessary for making all other conclusions of effectiveness valid (see Theory of Change in Figure 1). To assess the social validity of the supports package, I included questions about the goals, procedures, and outcomes of the supports in the interviews (see Appendix E). Then, the graduate assistant and I coded the interviews and also examined the observations, self-report logs, documents, and artifacts for evidence that both supported and disconfirmed claims of social validity about the goals of the support package, the procedures used for both Interventions 1 and 2, and the outcomes the team perceived on their functioning as a team, their own performance, and Eli's communication. We paid special attention for indicators that the interventions had produced outcomes that we had not anticipated, especially watching for unintended negative outcomes. From this analysis, we drew

conclusions about the social validity of the supports package and present the results in the following chapter.

Team functioning. Patton (2015) defined *sensitizing concepts* as "categories that the analyst brings to the data" that are used to examine "how the concept is manifest and given meaning in a particular setting or among a particular group of people" (p. 544). In the review of the literature presented in the section of Chapter 2 titled "Challenges (or supports) to AAC team functioning," I identified seven factors that are likely to influence the functioning of an AAC team: (a) philosophy, (b) experience and professional competence, (c) commitment, (d) training and support, (e) interpersonal skills, and (f) advocacy. We used these factors as sensitizing concepts to understand and organize impressions of the team's functioning at four key time periods in the study: (a) in baseline, (b) after Intervention 1, (c) during Intervention 2, and (d) after interventions. After each study phase, we examined all documents and artifacts and weekly self-report logs from that time frame, read the transcript each participant's corresponding interview to identify sections that addressed the sensitizing topics and coded these sections line-by-line to identify themes. We also examined the graphed single-case data for that phase, and discussed our impressions of the observations conducted during the time frame to identify data sources that addressed aspects of the team's experience around each sensitizing concept. We then used graphic organizers to summarize our interpretations of the team's experience around these sensitizing concepts and document the data sources supporting our interpretation. After we completed this process, we took a break from analysis for at least one week and then revisited our graphic organizers and supporting data, adjusting our interpretations as needed. Then, we used the graphic organizers to look across all sensitizing concepts to understand the story of how this team functioned, what changed over time, and what influenced these changes. This process

allowed us to understand *team functioning* not as a universal, operationalized set of behaviors, but to uniquely define this particular team's functioning within their unique context (Patton, 2015; Schwandt, 2007). We then developed a summary statement that explained the team's functioning for that phase of the study.

Instructional competence. To analyze the team's instructional competence across the study, we examined data sources from four distinct time periods in the study: (a) in baseline, (b) after Intervention 1 but before Intervention 2, (c) during Intervention 2, and (d) after interventions. We began analysis of instructional competence by examining the graphed single-case data for the phase, and, when applicable, comparing the trend, level, and variability of the corresponding data to data from previous phases. We also compared the trend, level, and variability of each dependent variable against the other dependent variables, looking for ways in which these variables interacted with one another. Then, we identified sections in the interviews that addressed instructional competence and conducted line-by-line coding of these sections in each participant's interview, taking notes in the margins of key words, repeating themes, and novel ideas that related to the team members' practice and perceptions of AAC instruction. Finally, we reviewed documents and artifacts, the weekly self-report log responses, and observation impressions and noted any supporting evidence for previously identified codes or additional key words or novel ideas not identified in the interviews. The codes from the interviews, documents and artifacts, and self-report logs were compiled into a list. This list of codes and the observations from the graphs of single-case data were used to build a summary statement that explained the team's instructional competence for that phase of the study.

Eli's communication. We repeated the same procedures we used to analyze instructional competence to analyze Eli's communication. When conducting visual analysis of graphed single-

case data, we used graphs of Eli's rate of independent responses using AAC, the level of prompting he received to speak via his AAC system, and the rate of communication exchanges he independently initiated.

Explanation building. Explanation building is an iterative process of pattern matching and exploring rival explanations to "stipulate a presumed set of causal links about [the case], or 'how' or 'why' something happened" (Yin, 2014, Section 5.2). Because I addressed a question about the effectiveness of an intervention package, this method of analysis was helpful in understanding the successes and/or failures of the interventions (Yin, 2014). We used Yin's four-step process for conducting explanation building for each time point in the study: (1) make theoretical statement about the phenomena of interest, (2) compare these statements to the data, (3) revise the theoretical statements to better reflect the participants, and (4) review the revised statements against the data from the participant.

My initiating theoretical statement was based on the review of literature that informed this study and my own professional experience, and it was directly connected to the research question to guard against drifting from the original purpose, one of the threats associated with explanation building (Yin, 2014). It was as follows:

> The supports package (i.e., Interventions 1 and 2) positively affected this team's (a) functioning as a team, (b) implementation of AAC instructional strategies with the child (i.e., instructional competence), and (c) the child's AAC skills.

To begin the explanation building process, we used the baseline summary statements, developed from the processes described in the previous sections, to develop an initial statement about the team's functioning, instructional competence, and Eli's communication under baseline conditions. We then conducted a second brief review of the data to look for disconfirming evidence and revised the statement as necessary.

Next, we used the summary statements from the post-Intervention 1 phase to conduct explanation building. We compared the summaries of the data from that phase to both our initial theoretical statement and the team's baseline statement to develop an explanatory statement about the effects of Intervention 1. We repeated this process to develop explanatory statements about the effect of Intervention 2 and about the total supports package under maintenance conditions. These explanations were used to answer the research question.

Ensuring quality. To increase the level of trustworthiness and credibility of these data analyses, we examined multiple data sources (i.e., interview transcripts, observation, self-report logs, documentation and artifacts, field notes) and completed this work collaboratively. The graduate assistant and I made every effort to purposefully engage with our biases and expectations and draw on our own prior, expert knowledge about teaming around AAC (Patton, 2015; Yin, 2014). Reflections on this are included in our final narrative. In addition, I gave every effort to demonstrate that we attended to all the evidence for the explanations we built and actively developed rival explanations (Yin, 2014). I include a description of these and the evidence for and against our explanations in this report.

Additionally, I conducted a member check with each adult participant during her final interview. First, I showed the participant three graphs of single-case data representing her performance and Eli's communication with them. After explaining the graphs and answering any questions, I asked her to share her impressions and if the graphs felt accurate and representative of her experience. Because we did not code Clair's videos for the single-case study and because she held primary responsibility for supporting Eli's AAC at school, I showed her all 12 graphs representing the other four participants' performance. Similarly, because Nina is Eli's parent, I

showed her all the other graphs after she reacted to her own. All five participants reported that the graphs were accurate representations of their experience.

> "I think that that [the graphs] really reflects what we did, so there's no surprise here for me." (Nina Final Interview, p. 23)

> The first thing that jumped out at me was, well, her modeling went down, but I think it's because then she was able to do other things like prompt him and increase opportunities. … So it shifts the balance or makes it more balanced. … This just makes me feel so much better, seeing that [the graphs]. (Clair Final Interview, p. 8 & 9)

> Yeah, that seems to be true, and these [points to graph of Eli's behavior], these are like he would surprise me, you know? So I can see, 'Oh, yeah!' Because I would get glimmers that he was, and those [points to graph] were the glimmers up there. (Lizzy Final Interview, p. 13)

Second, I shared the explanatory statements we had built about their baseline and post-Intervention 1 experience with each participant and asked her to edit the statements to most accurately reflect her perception of the team, her instructional competence, and/or Eli's communication. All five participants reported that these statements accurately reflected her perception of the team and her experience; no one offered revisions to these statements. Then, having seen these explanatory statements, I asked the participant to write a statement about their team functioning, instructional competence, and Eli's communication that represented that point in time (end of the study) using the same format we had used. The statements the participants created were used in building the final explanatory statements.

I also invited a team of researchers that included university faculty, a post-doctoral fellow, and graduate students in special education to engage in a data transformation exercise. The researchers broke into pairs and I gave each pair a set of graphs of the dependent variables from the single-case design study and a brief explanation of what the data represented. Then, I asked the researchers to develop an explanatory statement about either team functioning or instructional effectiveness (i.e., instructional competence and child's communication), depending

on the graphs they were given. We used the explanatory statements as confirmatory or dis-confirming evidence of the explanations my research assistant and I had developed. We were particularly interested in if and how naïve observers, most of whom were more familiar with quantitative traditions, ascribed meaning to those data in qualitative statements and the extent to which their naïve interpretations aligned or challenged ours.

Finally, I have given very effort to include a thick, detailed description to facilitate particularizability (i.e., allowing readers to determine the extent to which the findings are transferable to their own contexts) and an explanation of what data were included or excluded (Brantlinger et al., 2005) in this final report.

Mixing Methods

In this study, I collected and analyzed data using two different methodologies, single-case experimental design that aligns with quantitative traditions and case study that aligns with qualitative traditions in social science research. In single-case research, knowledge is developed by defining quantifiable, observable, and measureable behaviors prior to conducting a study and then counting and manipulating these behaviors over time to evaluate the effect of an intervention (Kazdin, 2011). In case study research, knowledge is developed by observing and exploring a case of interest in context and generating understanding about the lived experience of the case over time and through the interpretive lenses of the observers (Stake, 1995). By mixing methods, I attempted to value equally the knowledge that is generated through both methodologies and to integrate the differences between the two paradigms that guide these methods by "intentionally us[ing them] together to engage meaningfully with difference and, through the tensions created by juxtaposing [the] different paradigms, . . . achieve dialectical discovery of enhanced, reframed, or new understanding" (Greene, 2007, p. 69). I present how I

mixed these two methods for two primary purposes: (a) for development, and (b) for complementarity or initiation.

For development. Mixing methods for the purposes of development means that the results of one method are used to develop components of the other method (Greene, 2007). In this study, I mixed for the purpose of developing: (a) intervention content, (b) measures, and (c) single-case criteria.

Intervention development. I used the results from the initial (i.e., data collected prior to Intervention 1) case study analyses and the visual analysis of the baseline single-case data to identify the systematic prompting procedure included in Interventions 1 and 2. The prompting procedure selected needed to fit the participating child's present levels of performance with AAC while complementing and enhancing the team's existing knowledge and skills in supporting AAC. Thus, I used the case study analyses in conjunction with baseline single-case data of their current instructional practices to help identify which systematic prompting procedure best fit the team and the child's needs.

Measure development. I used the results of the case study analysis to develop measures for the single-case study, and I used the results of the single-case study to develop items in the case study data collection tools.

Developing single-case measures. I used the analysis of the case study data collected prior to Intervention 1 to develop the operational definitions for the dependent variable measures in the single-case design. Because the definition of these variables needed to be particular to the case being studied, I examined the evidence that was identified about the teams' instructional competence and the child's communication with AAC to determine the particular nature of behavior in which the team was already engaging. For example, my examination of initial

interview and observation data revealed that, prior to the intervention package, most members of the team were already engaging in high rates of aided AAC modeling because Nina had met with the school team, demonstrated this strategy to them, and asked them to use it consistently with Eli. Thus, I used the observation videos to develop examples and nonexamples of the operational definition of this strategy.

Developing case study data collection tools. Because the case study continued during the single-case design study, I used results from the visual analysis of single-case data to develop interview questions for the post-Intervention 1, post-Intervention 2, and final interviews and Self-Report Log questions. Using the data on individual performance, I developed targeted questions for the interviews that addressed aspects of agreement with and investment with the AAC system and plan as they related to changes in behaviors. I also used the data across participants to develop questions about team consensus around and supports and barriers to implementation of the AAC plan and about the team members' perceptions of the goals, procedures, and outcomes of the interventions (i.e., social validity).

Criteria development. Finally, to mix these two methods during analysis, I mixed case study data and the visual analysis results of single-case data to develop criteria for completing the Intervention 2 phase of the single-case study. To do this, I used the graphed data of the adults' performance of high-fidelity prompting to determine if each team member had met criteria for using systematic prompting, and I used each member's self-report (collected during the coaching sessions) of confidence in using the strategies to determine if her confidence further warranted release from coaching.

For complementarity or initiation. In addition to mixing methods for development, I mixed methods when interpreting results to answer the research question guiding this study. I did

this in the hope that the case study analysis results and the single-case design complemented one another and, therefore, strengthened claims I could make about the interventions' effectiveness (Greene, 2007). That is, in the instances where both the case study data and the single-case design data analyses pointed to positive change in the participants' team functioning and instructional competence over the course of the study, I present discussion and implications from the research that are broader and deeper than could have been presented if only one component of this study had been conducted because the different methods "tap into different facets or dimensions of the same complex phenomenon" (Greene, 2007, p. 101) of AAC service delivery (see Figure 1). When, however, the results of the two different components of the study did not complement one another but rather contradicted or diverged, I sought to mix the results of the two methods for the purpose of initiating "fresh insights, new perspectives, [and/or] original understandings" (Greene, 2007, p. 103). Because both the single-case and case study methods were used to examine the same complex phenomenon of AAC service delivery, when divergence existed between the results of each component, I still sought to explore this to better understand why this dissonance existed and how that contributes to our understanding of AAC service delivery.

To do this mixing, the case study data sources and the graphed data and visual analysis from the single-case study were used together and valued equally in building the explanations described earlier in this chapter. We made every effort to give equal weight to data collected for both methodologies in the answer to the research question. In the next chapter, I present our results framed as an integrated narrative that tells the story of this team's experience and provides an understanding of the effectiveness and limitations of the supports package they received, drawing equally from the conclusions derived from both methodologies.

Chapter 4

Results

Answering the Research Question

The purpose of this study was to engage with Eli's AAC team to address the following research question:

> In what ways and to what extent was a supports package for a child's educational team effective in supporting (a) the experience and functioning of the team around AAC, (b) competence in AAC instruction, and (c) the child's communication skills?

To address this research question, I employed two different research methodologies, case study and single-case design, and mixed these methodologies to better understand the phenomena of interest. We found that the supports package was effective in (a) supporting positive experience and cohesive functioning around AAC for this team, (b) improving the team member's confidence and competence in delivering evidence-based AAC instruction, and (c) supporting the child's sense of ownership over his AAC system and discriminating his AAC system from other possessions as a unique tool for communication. However, we also found that the supports package was ineffective and/or insufficient in supporting (a) sustained positive and cohesive team functioning, (b) deft and consistent instructional adjustments and problem-solving, and (c) the child's skills in using his AAC system independently and accurately for symbolic communication.

Presenting the Supporting Evidence

In the following sections, I present the results of our data analyses that led us to these conclusions about the research question. First, because the single-case design analysis of the primary dependent variable determined when all study activities occurred and because we conducted all analyses across both methods based on this timeline, I first present the results from

the single-case analysis of our primary dependent variable. Then, I present the results of the mixed methods analysis of the data sources from both methods for each time point in the study: (a) prior to intervention (baseline), (b) after Intervention 1 (structured team meeting), (c) during Intervention 2 (coaching), and (d) after intervention.

Single-case design: The primary dependent variable. I used single-case multiple baseline across participants design as one of the methods in this study. This design logic demands that the initiation of study conditions be determined based on data patterns that appear in graphs of dependent variable measures over time, as time is the key to maintaining experimental control. Because of this, Eli's AAC team received the two interventions of the supports package in question when data patterns in a single dependent variable sufficiently met design standards to warrant their initiation. This dependent variable was operationally defined as the Facilitators' high-fidelity use of most-to-least systematic prompting. In using this variable to make decisions about when to initiate the two interventions, I also used it to demonstrate experimental control and evaluate the efficacy of the supports package in developing the Facilitators' high-fidelity use of this evidence-based practice. Here, I describe the visual analysis and interpretation of these data.

The data representing the percentage of Facilitators' high-fidelity use of most-to-least systematic prompting are represented in Figure 6. Each tier in this figure represents the performance data of one of the Facilitators. The data points represent the percent of most-to-least systematic prompting use in which the Facilitator received a fidelity score of 4 (i.e., perfect fidelity) in the session. The sessions marked with an "x" are sessions during which the Facilitator never used prompting and the sessions marked with an open square represent sessions during which the Facilitator received one-on-one coaching (Intervention 2).

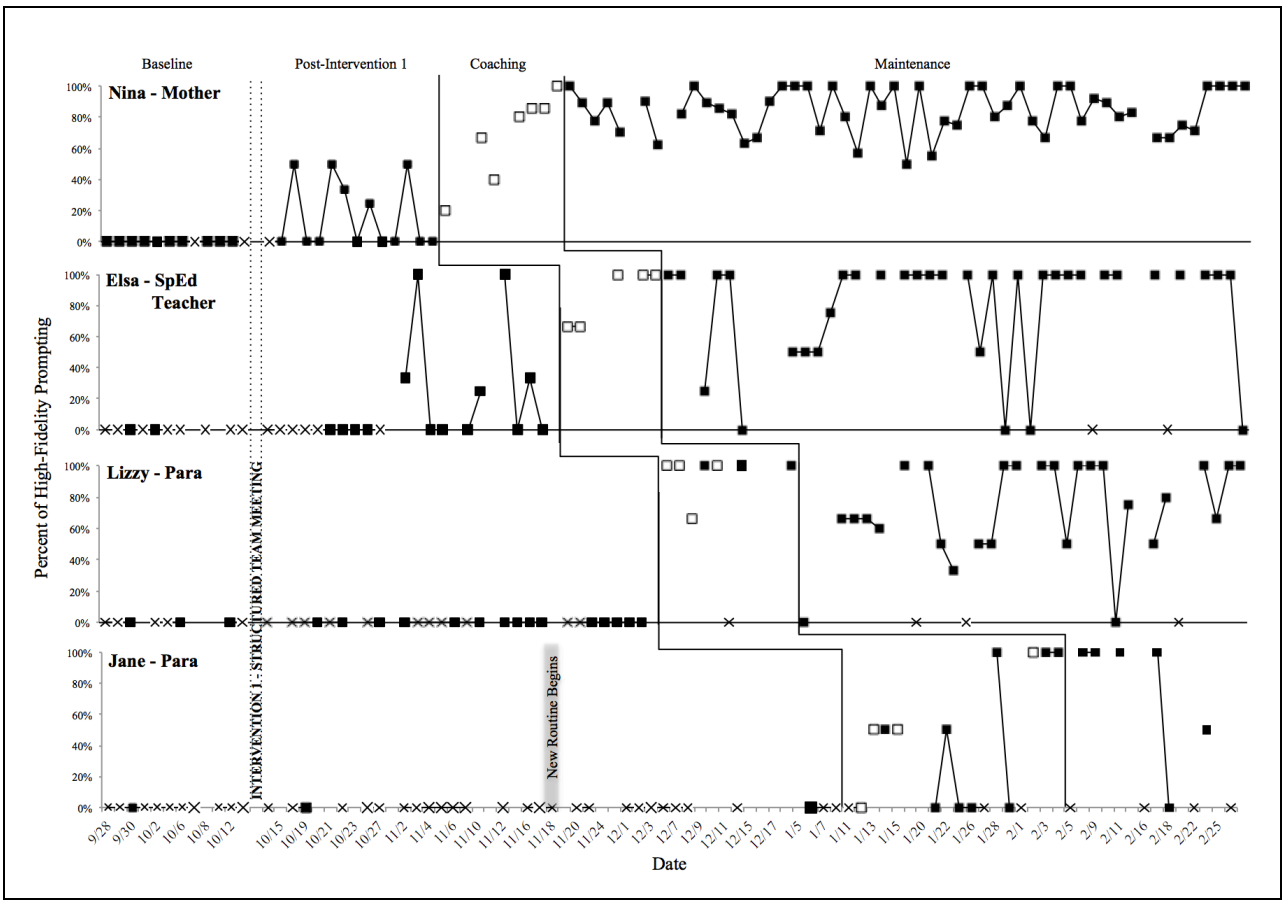


Figure 6. Single-case design graph of the primary dependent variable. Line graphs represent each participant's percentage of high-fidelity (score = 4/4) use of most-to-least prompting. Xs represent sessions during which participant never used prompting; open squares are days when the participant received coaching (Intervention 2).

In baseline, the Facilitators used most-to-least prompting with poor fidelity, and only Nina used prompting most days. Elsa, Lizzy, and Jane use prompting in only two, three, and one sessions, respectively. After the Facilitators participated in the structured team meeting (Intervention 1), marked by two parallel dashed vertical lines in Figure 6, Nina's use of high-fidelity prompting increased in both level and variability immediately following the team meeting. Elsa's use of high-fidelity prompting also increased in level and variability, but this change was delayed, with no changes in trend, level, or variability occurring for 10 sessions after the team meeting. Nina and Elsa did not reach performance criteria (three consecutive days of 80% high-fidelity use) after participating in Intervention 1, and no change in level, trend, or

variability was observed for Lizzy or Jane. By vertically analyzing the graph, we concluded that, for all Facilitators, coaching coincided with an increase in the average percentage of high-fidelity use of systematic prompting. During coaching, Nina's high-fidelity use followed an upward trend, steadily increasing until she reached performance criteria (i.e., three consecutive days of 80% high-fidelity use and self-reported confidence with the strategy). Elsa's high-fidelity use immediately increased above the her mean performance in the preceding condition upon receiving coaching, and, after two coaching sessions, increased to high and stable percentages of high-fidelity use. Upon receiving coaching, Lizzy's high-fidelity use increased immediately to a high and stable level of percentages of high-fidelity prompting use. Jane received coaching during four sessions, in which time her percentage of high-fidelity prompting use increased. Then, I had to travel and could only provide one coaching session (on 1/27) across a two-week time span. Jane's performance in probes during this time was variable, ranging from 0% to 100%. With two additional coaching sessions on 2/1 and 2/3, Jane's high-fidelity use increased to high and stable percentages of high-fidelity prompting use. During maintenance, all four Facilitators continued to engage in high-fidelity use of most-to-least systematic prompting but with increased variability in their performance data. In summary, the Facilitators began to engage in consistently high percentages (≥80%) of high-fidelity use of most-to-least systematic prompting only when coaching was provided (Intervention 2) after having received training in the strategy during the team meeting (Intervention 1).

These interventions created of four distinct time frames within this study during which the Facilitators interacted with Eli: (a) in baseline, prior to any intervention; (b) after the structured team meetings (Intervention 1); (c) while receiving coaching (Intervention 2), and (d) in maintenance, after coaching had ended. We used these time frames as a basis for

conceptualizing our explanatory case study. We graphed the remaining variables measured using the single-case design methods and mixed the insights they afforded into the explanations we built for each time frame. Thus, this primary dependent variable offers an experimental demonstration that the supports package was efficacious in producing increased instructional competence (i.e., high-fidelity implementation of an evidence-based strategy).

Now, I turn to the broader mixed methods explanations of how the supports package impacted the team's functioning and instructional competence and how this, in turn, affected Eli's communication. Importantly, the explanatory statements that follow derive claims of cause and effect from mixed epistemological paradigms, mixing claims based on the interpretations of the study participants and research team (case study) and claims based on observed and measured behavior change (single-case study). When the conclusions that could be drawn from the two methods diverged, I note this in the narrative and offer a description of the understanding these instances initiated that informed our explanations.

Mixed methods explanation: Baseline.

This team was moderately functional in supporting AAC, and the team members used basic AAC instructional strategies that helped Eli develop ownership of his AAC device and begin independently exploring it.

When this study began in mid-September, Eli's team members were still getting to know each other. Nina had prepared for the big transition to Kindergarten for months, diligently visiting different schools and asking to meet the speech-language pathologist at each one. Communication via AAC was her number one priority for Eli and she was determined to find a school that could support him well. She had met Clair, the SLP, the previous spring on her visit to Thomson Elementary School, just before Clair left for maternity leave. Their brief encounter

solidified Nina's decision about which school she wanted Eli to attend. Clair was exactly what she was looking for in an ally for AAC.[11]

Clair had been working at Thomson Elementary for 3 years and was pleased that she had the opportunity to work with several students who were learning to use AAC. As she left for her spring-summer maternity leave, she looked forward to returning to work in the fall in time for Eli's first day of Kindergarten. It was a rare treat to have a student who already had an AAC device and did not need her to write a funding report.[12]

As the summer drew to a close, the special education teacher Nina was expecting Eli to have in the fall moved away, and another teacher who had worked at Thomson for 3.5 years, Elsa, stepped into her position with only a few days to spare before Eli and the rest of the student body arrived for the first day of school. Although Clair and Elsa had worked together the previous school year, this was Elsa's first experience supporting students who used AAC and supervising paraprofessionals who would work with her students. Elsa was trying to quickly get a handle on her new job, her new caseload of students, and how to supervise paraprofessionals.[13]

Meanwhile, Lizzy learned that Elsa was going to be her new boss. Having been a paraprofessional at Thomson for 6 years, she was used to last-minute changes, but she had heard rumors about Elsa from some other paraprofessionals and was not quite sure what to think about this reassignment.[14] Jane was new to Thomson, having been a substitute paraprofessional there a few times in the past year but just beginning a full time position.

Thus, Eli's team was still getting to know one another and figuring out a schedule and system for moving through the school day in mid-September. Wanting to make sure that Eli's

[11] Nina's Initial Interview, p. 15.
[12] Clair's Initial Interview, p. 5.
[13] Field Notes, 9/14; 9/15; 9/19; Elsa's Initial Interview, pp. 1-3.
[14] Field Notes, 9/19.

AAC did not get missed in the process, Nina asked Elsa and Clair to set up a time for her to meet with everyone on Eli's team to teach them about his AAC system and show them how to use it to model language. Eli had handled the switch to Kindergarten with amazing ease, and, by the time Nina arrived for the meeting with his team, Eli had won most of his team over with his big smile and generous hugs. Almost everyone on the school team came for the meeting with Nina. Clair had another meeting, but Elsa, Lizzy, and Jane were joined by the other two paraprofessionals on his team, Eli's general education teacher, and Elaine, the certified occupational therapy assistant (COTA). Nina showed them how to use the PODD with Compass app and, "gave them sort of like a timeframe. So for the first couple weeks, if you see Eli, make sure you see PODD. And then, you start using Chat Words to get comfortable."[15]

By mid-October, Eli's team was *moderately functional in supporting his AAC*. Clair and Nina's compatible philosophy about AAC, which drove the team's philosophy, supported the team's functionality. Although Clair and Nina's philosophy about language development differed in some respects, they both firmly believed that AAC is a child's voice and, therefore, their fundamental obligation to support, and they were both committed to presuming competence.[16] Furthermore, Clair firmly believed that supporting the family's preferences was key to AAC success, stating, "Mom is on board, and a lot of times that's half my battle with AAC. So if I don't have to fight that battle, I'm going to support what they're doing at home because he's at home more than at school."[17] Elsa, Lizzy, and Jane were happy to follow Nina and Clair's lead. As Lizzy put it, "I just really play a small part in his role to communicate. I feel like I'm a caregiver doing what I am asked to do with him."[18] Elsa said, "I talk to Clair quite a

[15] Nina's Initial Interview, p. 9.
[16] Field Notes 9/25.
[17] Clair's Initial Interview, p. 5.
[18] Lizzy's Initial Interview, p. 6.

bit. She doesn't see Eli every day, obviously, but we're in constant communication.[19] And his mom is amazing too for coming in and giving us a presentation the second week of school."[20]

Also contributing to the team's functioning was the fact that each team member's responsibilities related to Eli's AAC success was balanced with the amount of AAC support they received. For example, Nina and Clair had the largest amount of responsibility for Eli's success but they both also had the most access to training and support around AAC. Nina had the time, motivation, and financial ability to attend trainings and conferences about AAC,[21] and Clair had professional resources available to her.[22] Finally, there was strong cohesion between Clair, Nina, and Elsa, and this bond, that was strengthening almost daily during these two months, helped them develop action steps, solve problems, and build trust.[23]

That being said, the team's functionality was moderated by variability in its members' (a) experience and professional competence with AAC,[24] (b) levels of training and support in AAC and instruction,[25] (c) levels of commitment to Eli's AAC learning,[26] (d) willingness and ability to advocate for Eli's communication success,[27] and (e) resistance from some paraprofessionals, including the two paraprofessionals who did not participate in this study, toward the professional members of the team (i.e., Elsa and Clair).[28]

---

[19] Elsa's Initial Interview, p. 11.
[20] Elsa's Initial Interview, p. 5.
[21] Field Notes 9/2; Nina's Initial Interview, p. 3
[22] Clair's Initial Interview, pp. 1-3.
[23] Field Notes 9/15, 9/19, 9/25.
[24] Nina's Initial Interview, p. 5, Email 9-23, Pre-study Email; Clair's Initial Interview, pp. 1-3; Lizzy's Initial Interview, p. 1, 6; Elsa's Initial Interview, pp. 1-2, 8, 10-11; Jane's Initial Interview, pp 1-2; Field Notes 9/2, 9/19.
[25] Clair's Initial Interview, pp. 1-3; Lizzy's Initial Interview, p. 1; Elsa's Initial Interview, pp. 1-2; Jane's Initial Interview, pp. 1-2; Field Notes 9/2, 9/19.
[26] Clair's Initial Interview, p. 11; Elsa's Initial Interview, pp. 11-12; Lizzy's Initial Interview, p. 9, Post-Coaching Interview lines 535-536; Jane's Initial Interview, p. 10-11; Intervention 1 transcript minute 58; Field Notes 9/25.
[27] Field Notes 9/19, 9/25, 10/12; Lizzy's Initial Interview, p. 2.
[28] Field Notes 9/19; Nina's Initial Interview, pp. 8-9.

By mid-October, the team members were also *using basic AAC instructional strategies.* All team members were consistently ensuring that Eli's AAC device was with him at all times[29] and were using aided AAC modeling with varying rates during their routines with Eli. By September 25, Elsa reported, "I feel like the team has done a great job keeping Eli's PODD near at all times. They have done a great job of modeling what's next as well."[30] Lizzy and Jane both reported that they were still trying to figure out how to juggle Eli's AAC device and modeling with it while keeping up with him. As Jane said, "I am still working out how to keep him in one spot and then push this [button on the device to model]. I just feel like I'm not very good at it. I feel like he's on to the third thing before I've hit the first button I'm supposed to push."[31] The single-case measures we collected from the video footage supported the team's observations. As shown in , all four team members who spent time with Eli every day used aided AAC modeling at higher rates than strategies for creating opportunities or most-to-least systematic prompting.

As a result of this team's functioning and basic instructional competence, *Eli developed ownership of his AAC device and begin independently exploring it.* Although the team felt that Eli still relied on behaviors as his primary way of communicating,[32] all of the team members reported that they felt that Eli had become possessive of his AAC device and was exploring it more, doing what Clair called "babbling."[33] In early October, Nina reported, "We were leaving to go to a soccer game and he went to get his [device] and took it straight to the door."[34] Jane noted, "What I've noticed lately is that he wants to hold it and push it a lot. And, he's not

[29] Video Observation Notes; Elsa's Weekly Self-Report Log 9/25.
[30] Elsa's Weekly Self-Report Log 9/25.
[31] Jane's Initial Interview, p. 4.
[32] Nina's Self-Report Logs 9/24, Nina's Initial Interview, pp. 5-6; Clair's Initial Interview, p.4; Elsa's Initial Interview, pp. 4-6; Lizzy's Initial Interview, p. 3; Jane's Initial Interview, p. 5.
[33] Clair's Initial Interview, p. 4.
[34] Nina's Self-Report Log 10/2.

pushing [specific buttons], but, to me, it means that he wants to do it. He'll take it from me."[35] Elsa said, "He's even reaching for his device. The first few weeks, it would be there and he wouldn't even reach for it, but now it's like him either holding onto it, he puts his ear up to it. … So, I've noticed a huge change."[36] Along with this, Clair said,

> So he likes [it] close, and he will—I'm going to call it babbling—he will babble with his device. Sometimes, it's appropriate and I'm like, 'Oh, that was right on, kid!' Other times, he's just babbling. So, I don't see him using it with purpose yet, but we don't expect [that] yet.[37]

Nina made the same observation, sharing,

> When he really does a lot of babbling on PODD, really touching it a lot and where I can respond to him. Like yesterday, I was giving him a snack and I said, "Would you like a drink?" And he pressed JUICE. I said, "Ok, so let's go get juice." So where he babbles something that I can actually respond to, he likes that because he feels that he has power with his device.[38]

The single-case measures we collected from the video footage supported the team's observations about Eli's communication behavior. Figure 7 shows the topography of Eli's communication during the 5-minute video clips we coded during baseline. Eli primarily used nonsymbolic communicative behavior (blue bars) to respond to adults, but also babbled with his device in response to adults or to initiate communication with them (green bars).

[35] Jane's Initial Interview, p. 5.
[36] Elsa's Initial Interview, p. 4.
[37] Clair's Initial Interview, p. 4.
[38] Nina's Initial Interview, pp. 6-7.

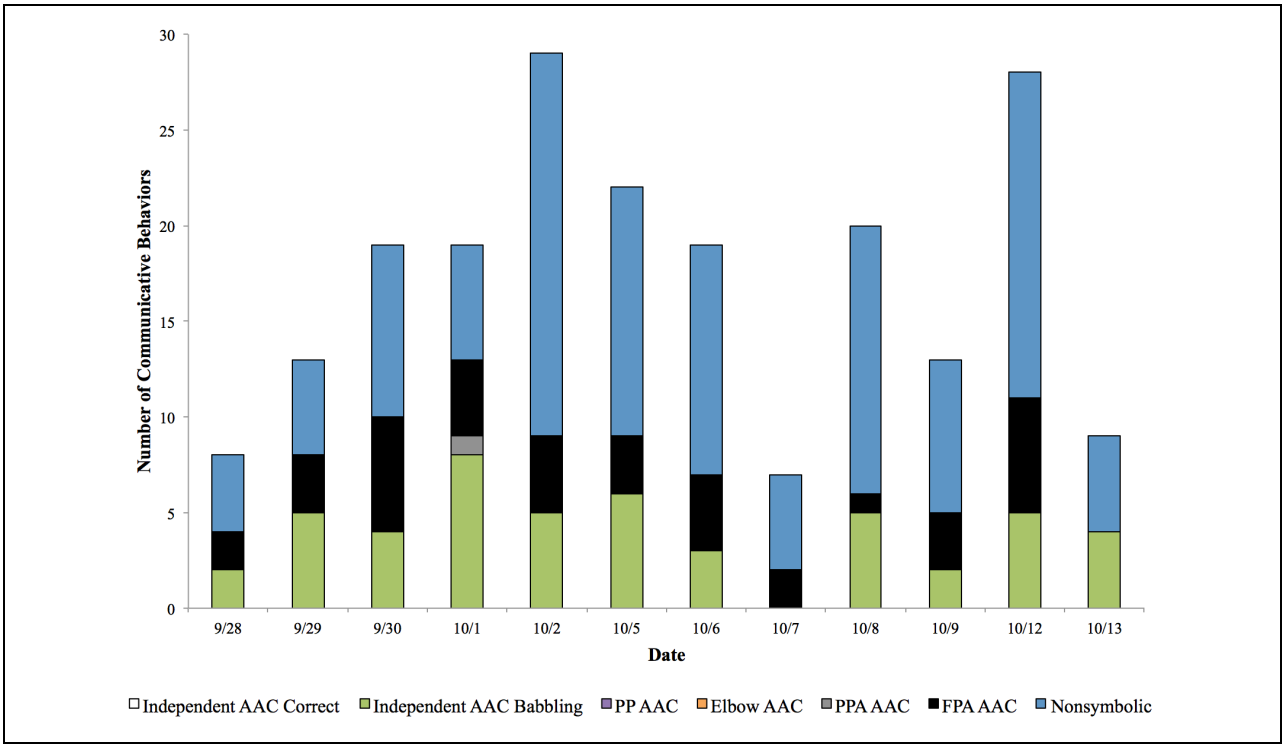


Figure 7. Topography of Eli's communication in baseline across Intervention Routines with Nina, Elsa, Lizzy, and Jane. PP is point prompt; PPA is partial physical assistance, FPA is full physical assistance.

Thus, as they prepared to participate in the structured team meeting (Intervention 1), *this team was moderately functional in supporting AAC, and the team members used basic AAC instructional strategies that helped Eli develop ownership of his AAC device and begin independently exploring it.*

Mixed methods explanation: After Intervention 1.

Because of the team meeting:
This team's functioning improved slightly, and its members began exploring more sophisticated, evidence-based AAC instructional strategies that helped Eli transition from seeing his AAC device as a possession to a distinct tool for communicating.

On October 13, the team gathered at Boris and Nina's house for the structured team meeting (Intervention 1) after school. Boris, Eli's father, and Elaine, his occupational therapy assistant from school, joined Nina, Clair, Elsa, Lizzy, and Jane and the team spent 2 hours around the kitchen table, working their way through the scripted agenda and discussing their

hopes, fears, and plans for Eli's AAC. Toward the end of the meeting, I provided them with a brief training in the use of aided AAC modeling, strategies for creating opportunities, and using most-to-least systematic prompting. At the end, all of the team members came to consensus about their next steps and signed their names to signify their commitment to action.

As a result of the team meeting, the *team's functioning improved slightly* because the meeting caused small, positive shifts in many factors that influence team functioning. In the first month after the meeting, many of these shifts were obvious but others became clear at the end of the study as the team members reflected on their experience. Immediately after the team meeting, it was clear that it helped Elsa, Lizzy, and Jane better understand Clair and Nina's philosophy about AAC and, with that understanding, trust more in their leadership.[39] The team meeting also gave Nina, Lizzy, and Jane their first experience with training and support specific to Eli and PODD,[40] and everyone reported feeling more confident in advocating for and committed to Eli's AAC success.[41] Clair best summarized the meeting's effect by stating, "Overall, it was a good experience and it was good to know people's background and what they felt comfortable with and to know their experiences with Eli too. It gave us all a similar vision."[42] When she reflected on the team meeting five months later, she reiterated,

> Getting the whole team on board, people that are with him more than I can be with him, that's definitely going to help. And that is usually a big hurdle with AAC is getting everyone on board, so I think that was awesome.[43] . . . Having that team member buy-in was really nice this year and not having to be like, "This is why we're doing this" over and over and having the same conversation.[44]

[39] Elsa's Post-Intervention 1 (I1) Self-Report Logs, Post-I1 Interview, p. 3; Lizzy's Post-I1 Interview, pp. 2-3; Jane's Post-I1 Interview, p. 6, Post-I1 Self-Report Logs.
[40] Nina, Jane, and Lizzy's Initial Interviews.
[41] Intervention 1 Meeting Notes; Post-I1 Self-Report Logs (all); Field Notes 10/21, 11/14; Jane Document 11/12; Lizzy's Post-I1 Interview, p. 2, 4.
[42] Clair's Post-I1 Interview lines 5-9.
[43] Clair's Final Interview lines 85-87.
[44] Clair's Final Interview lines 342-345.

However, there were also features of the team meeting that limited its impact on the team functioning. First, all of the members of Eli's educational team were not required to attend, and, as Clair noted, because some paraprofessionals chose not to attend, many of the interpersonal conflicts within the school team remained or were potential exacerbated. Clair said, "[The meeting] was beneficial, but we still didn't have everyone, so then there is an asterisk by the success of that."[45] Second, in spite of the ways the meeting helped Lizzy and Jane feel like more committed and connected members of the team, they both continued to express doubt that their efforts with Eli were important or influential. Lizzy said,

> I thought it was really helpful. It did make me feel like I was more a part of the team.[46] . . . As an aide, I just feel like I am never going to be really a part of the team. I mean, this is my seventh year and I just know that is how it is.[47]

Jane had similar thoughts, saying that at one point during the meeting,

> I felt a little like, "Ok, I don't belong here." I am not the speech pathologist, I am not the OT, I am not his teacher, I a not his parent. I am not anybody else besides somebody who thinks he is super cool and just loves him.[48]

Thus, the team meeting did cause small, positive shifts in team functioning around Eli's AAC but did not address all of the team's needs.

The team meeting also caused the team members to *began exploring more sophisticated, evidence-based AAC instructional strategies*. During the meeting, I provided brief training in three evidence-based instructional strategies for supporting Eli's AAC learning: (a) aided AAC modeling, (b) creating opportunities, and (c) most-to-least systematic prompting. As noted previously, the team members were already using aided AAC modeling with Eli in baseline, although the rate at which it was used and people's comfort with its use varied widely. After the

[45] Clair's Post-I1 Interview lines 35-37.
[46] Lizzy's Post-I1 Interview line 5.
[47] Lizzy's Post-I1 Interview lines 87-89.
[48] Jane's Post-I1 Interview lines 238-243.

team meeting, everyone began trying to incorporate strategies for creating opportunities and most-to-least systematic prompting into their routines with Eli, mostly focusing their energy on prompting and reporting many issues with incorporating these instructional strategies into their routines.

When looking at the graphed single-case data we collected on the rate at which team members used the three instructional strategies with Eli, we observed changes in how often they used each strategy, with the most pronounced change being an increased use of prompting. In the graphs in Figure 8, the blue areas represent aided AAC modeling, the red lines represent creating opportunities, and the green bars represent most-to-least prompting (regardless of fidelity score). The vertical dotted lines denotes the team meeting and the number of sessions each person had with Eli before varies by person, as one-on-one coaching began with each member after another had mastered the strategies (marked by vertical black lines). Across all team members, the proportion of red (opportunities) and green (prompting) bars increased after the team meeting, but, except for Jane, they were using the prompting strategy (green bars) more than they were creating opportunities (red bars). As discussed previously and as shown in Figure 6, the fidelity with which the team members used the prompting strategy did not increase to proficiency and only Nina and Elsa were ever able to use this strategy with high fidelity with only the training provided during the team meeting (i.e., without coaching). These observations are consistent with the team members' self-reflections.

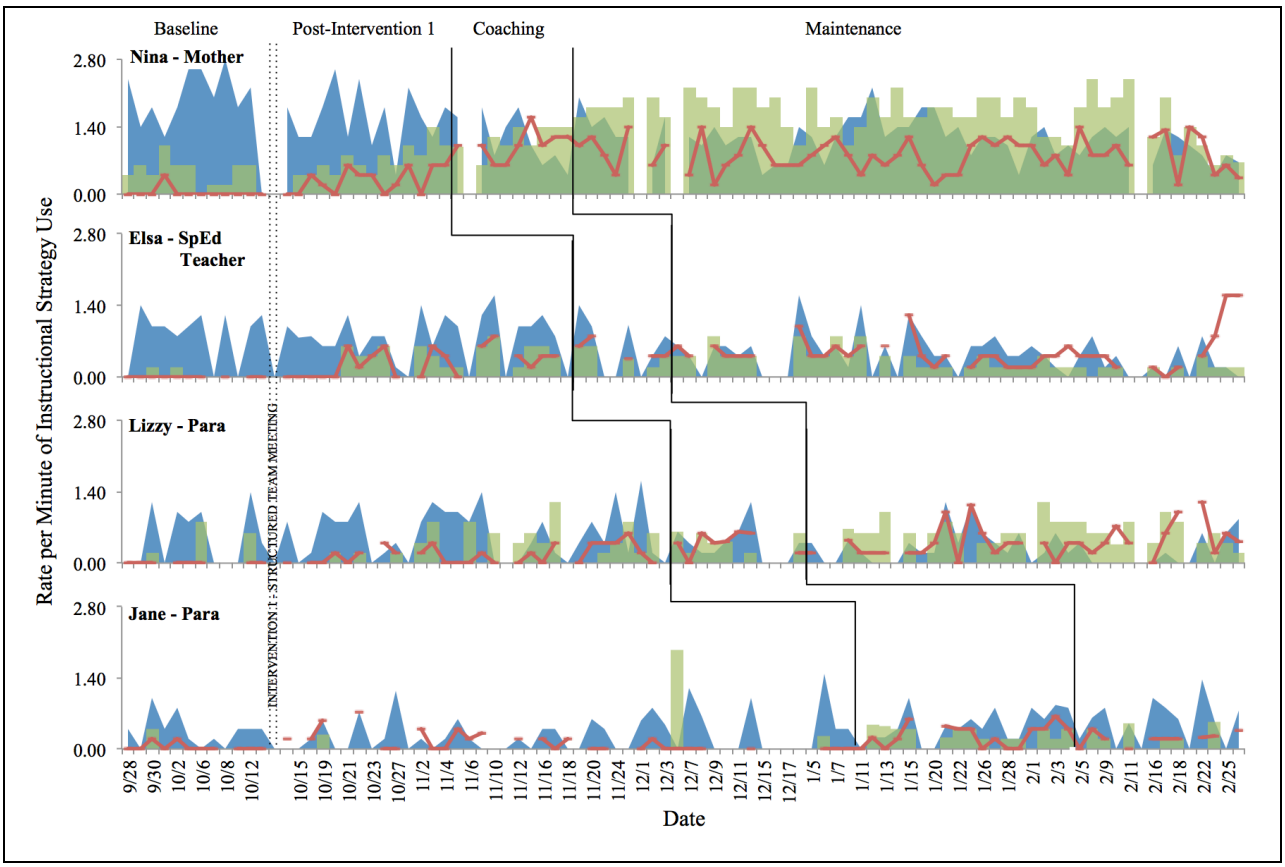


Figure 8. Rate of strategy use during Intervention Routines across Facilitators and conditions. Blue areas are aided AAC modeling, red lines are creating opportunities, green bars are systematic prompting use (any fidelity score).

During their individual interviews that followed the team meeting, all five team members reported trying to use prompting more with Eli, but each member also identified areas of struggle in doing so. Nina was most concerned about how to set up the device to help Eli access it easily, saying,

> I am trying to incorporate whatever techniques with prompting a little bit. So I am trying to do that . . . [but] I didn't have a stand that would [make the device] stand up. So, I would put it down [flat]. I could see that he liked that so I would try to put it up and put it down to see what would work better. We are experimenting with that.

Elsa noticed changes in her, Lizzy's, and Jane's efforts with the strategies as a result of the team meeting, stating,

> I think [the meeting] was very valuable and beneficial. I feel like the aides are more comfortable with the process. . . . I do it, I think, but . . . those language pieces that I am

> learning were really helpful. I can hear Lizzy doing a lot of those [strategies] now, and Jane is trying too.[49]

Her main concern was with the technical details of using the instructional strategies, saying,

> I obviously have always felt comfortable with technology so that never scared me, so I think that the modeling was good to hear. But now that the next step of hand-over-hand and where we are fading prompting…will really help me, because, the specifics, that's where I wouldn't know what to say.[50]

Lizzy and Jane both reported that they were trying to use the strategies more but were having the most difficulty figuring out how to use them when Eli was distracted or trying to take the device away from them. Lizzy said, "It's frustrating and I just wasn't comfortable sharing that at the meeting. Sometimes, I feel like I give up. I give up trying to say, trying to find what I was going to find if he is too grabby."[51] Similarly, Jane recounted,

> It is changing. I wouldn't say I am comfortable with it yet, but I think I will get there. I will say that sometimes I feel like it is hard at the times I have him because we are either on the stage where all he wants is that tent or outside, which is really hard.[52]

Clair, too, was noticing the shift in the team's focus, sharing, "I think that people feel more comfortable prompting him and knowing how and when to prompt him. I still feel like there is room for improvement. . . . Everybody learns differently. A lot of people learn by doing."[53] She shared the others' concerns but also identified concerns about the PODD with Compass app that she feared were beginning to interfere with Eli's learning. The navigation features inside the PODD app were beginning to cause difficulty. There were multiple buttons in various locations on the screen that needed to be selected to return to the home page any time another button was touched. Because these navigation buttons varied in symbol, name, and

[49] Elsa's Post-I1 Interview lines 143-151.
[50] Elsa's Post-I1 Interview lines 425-429.
[51] Lizzy's Post-I1 Interview lines 277-291.
[52] Jane's Post-I1 Interview lines 491-496.
[53] Clair's Post-I1 Interview lines 462-466.

location on the screen depending on what button was touched, it was challenging for the adults to find their way back to the home page when either they or Eli made a mistake.

> It is difficult to prompt him when it is not automatically going to the home page and when finding some core words does take several hits.[54] I feel like I spend more time in minutes trying to get back to the home page.[55] I don't think he knows how to find anything on it yet, but that is where some of my frustration is with the system.[56]

Thus, the team meeting affected the members' instructional competence by increasing their knowledge of AAC instructional strategies and spurring them to explore using these strategies with Eli. However, the training during the team meeting was not sufficient to help the team members reach full instructional competence or problem-solve when issues arose during instruction.

With the team's improved functioning and exploration of the more sophisticated instructional strategies from the team meeting, *Eli transitioned from seeing his AAC device as a possession to a distinct tool for communicating.* Of note, evaluating the indirect effects of the team meeting on Eli's communication is difficult because the next phase of the supports package, one-on-one coaching, began with Nina on November 5 while the rest of his team continued to work with him without any additional support. Then, when Nina was using most-to-least prompting with high fidelity (see criteria in previous section regarding single-case design study), Elsa received coaching, then Lizzy, then Jane. Thus, although team members began noting shifts in Eli's communication before anyone received coaching, these shifts continued after coaching had begun with some team members.

In the interviews immediately following the team meeting before anyone had received coaching, the major theme repeated by all the team members was that Eli had become

[54] Clair's Post-I1 Interview lines 202-203.
[55] Clair's Self-Report Log 10/27.
[56] Clair's Post-I1 Interview 508-515.

increasingly more possessive of his device, now expressing this to the extent that it was sometimes difficult to use aided AAC modeling because he would take the device away from them.[57] As Lizzy put it,

> I haven't seen any changes other than his possessiveness of [his AAC device]. He is super possessive of it. At first, it was just the [other iPad] that had the videos on it, but now it is both of them. He wants them both and the Dora toy. He is happiest when he has the Dora toy, his communication device, and his other iPad.[58]

But, she later added, "It is increasingly frustrating to model for Eli because he is so possessive with his PODD. I feel badly grabbing it out of his hands, but that is the only way I can get it sometimes."[59]

However, by November 2, three weeks after the team meeting, the team members began reporting shifts in Eli's behavior that indicated he was beginning to distinguish his AAC device from his other possessions. On her weekly self-report log that day, Clair noted,

> Eli actually went to his device when I put the video of his dad out of reach! However, he didn't hit any buttons that would communicate what he wanted at that moment (help, more, etc.). I was just happy to see that he actually went to the device and didn't keep trying to grab my hand or climb up the bookcase that I put the video on top of.

A few days later, Jane shared,

> I took Eli outside for a walk. He regularly fights me about this, pulling me back toward the school, attempting to bite. This time, he started to pull my arm and turn. He quickly looked at his PODD and started hitting it and looking up at me. He knew it could get him what he wanted. Then, it wasn't working several of the days [this week] and he continued to try to push buttons and, when it didn't [speak], he tried to put my hand on the AAC.[60]

A week later, Lizzy reported the same experience, saying,

[57] Nina Self-Report Logs 10/15, 22; Clair Post-I1 Interview line 508; Elsa Post-I1 Interview lines 443-44; Lizzy Post-I1 Interview lines 263-68, 417-21, Self-Report Logs 10/23, 11/8, 16; Jane Post-I1 Interview lines 349-50.
[58] Lizzy's Post-I1 Interview lines 263-274, 419-20.
[59] Lizzy's Self-Report Log 11/2.
[60] Jane's Self-Report Log 11/5.

> During PRT [pivotal response teaching; her Intervention Routine], Eli grabbed for the device several times instead of reaching for the box of toys or the sensory beans we play with. I felt like he knew his PODD was what he needed to get the items he wanted![61]

Thus, the team members were observing Eli transition in his understanding of his AAC device. While it had already become a possession he cared about and wanted near him, now they were seeing indications that he was figuring out that it served the unique purpose of communicating his wants to other people. Unfortunately, the codes we used to measure his observable behaviors for the single-case study were not sensitive enough to capture this shift. Our coding rules dictated that both reaching for a toy and handing his device to another person were coded as "nonsymbolic" communicative behaviors. Thus, the only noticeable shift in Eli's single-case data was that, as the team members began using systematic prompting, the number of prompted AAC use he engaged in necessarily increased. As the team members began to receive one-on-one coaching, they already had the benefits of the team meeting, including that their *functioning had improved slightly, and the members had begun exploring more sophisticated, evidence-based AAC instructional strategies that had helped Eli transition from seeing his AAC device as a possession to a distinct tool for communicating.*

Mixed methods explanation: During Intervention 2.

Because they received one-on-one coaching:
This team's functioning improved slightly yet again.
Its members developed proficiency with evidence-based AAC instructional strategies and confidently and comfortably integrated these strategies into their routines.

Concurrently, instead of or in addition to engaging in nonsymbolic communicative behavior, Eli would (a) hand his AAC device to a communication partner, or (b) pull a communication partner's hand to his AAC device, and he generalized these behaviors to Facilitators who had not yet received coaching and maintained these behaviors while the remaining facilitators received coaching.

[61] Lizzy's Self-Report Log 11/8.

Although team members received one-on-one coaching (Intervention 2) at different times, it still caused the *team's functioning to improve slightly yet again* after the improvements observed following the team meeting. By receiving coaching, the team members had access to training and support, which, in turn, improved their competence with AAC, allowing the team members to share the responsibility for Eli's AAC learning more equally across the contexts of his daily life. For example, Elsa noticed changes in her competence, saying,

> I know the specific behaviors and I'm able to know the outcomes and pinpoint exactly what Eli's goals are and what and how to allow those opportunities in the time I'm working with him because [the strategies] fit pretty well with what I'm doing.[62]

She also commented on the distributed effort across team members, sharing, "Everyone's trying really hard. Everyone seems to be somewhat on the same page, for sure those participating in the [research study] are."[63]

From her vantage point, Clair observed,

> Having a common language is helpful, especially with Elsa because I feel like it gave her so much more confidence. Instead of me telling her, "This is what you should do," she was able to problem-solve with me. It wasn't like, "This is the communication thing. That's your job." I think it gave her more of a, "This is how we're working with him as an educational team." It wasn't, "That's the box that the speech therapist uses."

As a result of coaching, the team members also maintained their full commitment to Eli's AAC success or grew in their commitment to this. Lizzy said, "I just feel like [coaching] made me want to use the PODD more, and also I notice when some people aren't taking opportunities to use it."[64] Jane echoed the similar sentiments,

> I feel like, as he continues on the road, I feel like I can keep doing it and then I'm capable of learning if there's more to come. [Coaching] made me feel like I can be on board with what they're doing and contribute to it. I feel like I'm contributing to him. I feel like at least I can contribute to him and I can do my job and I can do what Elsa needs me to do,

[62] Els'as Post-Intervention 2 (I2) Interview lines 510-517.
[63] Elsa's Post-I2 Interview lines 453-461.
[64] Lizzy's Post-I2 Interview lines 312-313.

> and what his parents need me to do, what his [general education] teacher needs me to do.[65]

Clair, too, noticed a difference, saying,

> Even though I didn't get the coaching piece of it, I felt like that gave, especially the aides, a lot of confidence to work with Eli and work with the device than they would have had without it. Knowing some of them would be able to find a button faster than I could is awesome, and not having aides afraid to touch a device! The coaching piece also helped give people a direction of, 'This is where we are going,' and helped to break it down and make it more concrete.[66]

Coaching directly impacted the team's instructional competence, with *its members developing proficiency with evidence-based AAC instructional strategies and confidently and comfortably integrating these strategies into their routines.* As previously discussed, only after coaching was introduced did the team members develop consistency and proficiency with using most-to-least systematic prompting with high fidelity (see Figure 6). In addition to increased high-fidelity use, we also observed continued increased balance among the rates at which some team members used the three instructional strategies. In baseline, aided AAC modeling dominated the team members' instruction. After the team meeting, each person incorporated more opportunities and prompting into their repertoire but aided AAC modeling was still used more frequently than the other strategies during most sessions. However, during coaching, they used the three strategies in more equal proportions during their routines with Eli, with aided AAC modeling no longer markedly or consistently dominating anyone's strategy use, as shown in Figure 8 (see also Figures 1-4 in Appendix C for graphs to individual scale). Again, in this figure, the rates at which each strategy was used in a session across the study conditions are shown, with blue areas representing rate of aided AAC modeling, red lines that of creating opportunities, and green bars that of most-to-least systematic prompting. Each team member is

[65] Jane's Post-I2 Interview lines 283-300.
[66] Clair's Final Interview lines 48-54.

represented on a tier with two vertical dashed lines denoting the team meeting and solid black lines denoting coaching.

In addition to these observed behavior changes, the team members spoke eloquently about the ways they changed their own behavior when supporting Eli's AAC learning and discussed the instructional strategies with a level of sophistication they had not used after training at the team meeting. Nina shared,

> I think waiting, like giving the time for the response, this is a very big one that a lot of parents forget. We want them to be able to think of something immediately so we just hurry, hurry, hurry. So, for Eli, it takes a long time. The waiting was very important. And, being silent during prompting and interrupting the behaviors. Because for us, for parents, it's intuitively any kind of communication your child does—reaching, a look—in order to count it as communication. But now we have to separate it and say, "No, right now I'm teaching you how to use this device so your reaching is not going to be enough." Sometimes, I feel strange doing this, but I know that we are teaching him to [use the device] so it's ok and we've seen when he goes to the device now. We have seen this.

Jane, too, shared that it was hardest for her to learn to silently prompt Eli and then speak to reinforce his message, but,

> then, it does get easier. It really does and I still think every time I do it, "Did I do it right? Was I supposed to do that?" And when I have those feelings, I just stop whatever I'm doing and say, "Eli, that's not what we meant to say." Two weeks ago [before coaching], I would have flipped out [when I made a mistake]. So, yeah, I feel more confident about that.[67]

Repeatedly, the team members expressed how much more confident and comfortable they felt with Eli's AAC after receiving coaching. Lizzy said,

> Oh my god, that was so validating. I went home and told my husband about it. I mean, I was like, "Oh my god, I'm doing this and I'm doing this." So, it was really validating, you know? All confidence builders.[68]

Elsa said, "I think [coaching] has been beneficial. Looking at the data, like how he had opportunities before we met and then how many opportunities he had once I understood or knew

[67] Jane's Post-I2 Interview lines 22-43.
[68] Lizzy's Post-I2 Interview lines 214-227.

his actual behaviors and how to prompt was really helpful."[69] During the coaching sessions, I also asked the team member to rate her confidence with each strategy. By the end of coaching, all participants reported feeling confident with the strategies and comfortable using them without continued coaching.[70]

Finally, the team members reported that they were able to use the instructional strategies across routines with Eli. For example, Nina wrote,

> Wednesday was a day off from school, so PODD traveled with Eli the whole day—to the restaurant, park, store, and swim lesson. Lots of opportunities to model and prompt. We practiced prompting "more," "look," "help," and "go" when Eli indicated corresponding words with his behavior.[71]

Lizzy also noted that she tried using the strategies during an activity in the Kindergarten classroom, saying, "I feel it was successful because he was engaged with other students while I modeled conversations with classmates."[72] The observation data from their Generalization Routines for the single-case design study complimented these reports, as the team members increased the rate with which they created opportunities during Generalization Routines during coaching (see Figure 6 in Appendix C).

Eli's communication was influenced by the team's increased functioning and instructional competence that resulted from receiving coaching (Intervention 1). The changes described during the Post-Intervention 1 phase solidified during Intervention 2: *instead of or in addition to engaging in nonsymbolic communicative behavior, Eli would (a) hand his AAC device to a communication partner, or (b) pull a communication partner's hand to his AAC device, and he generalized these behaviors to Facilitators who had not yet received coaching and maintained these behaviors while the remaining facilitators received coaching.*

[69] Elsa's Post-I2 Interview lines 17-20.
[70] Coaching Fidelity Checklists.
[71] Nina's Self-Report Log 11/13.
[72] Lizzy's Self-Report Log 12/11.

However, as team members received coaching and transitioned into the maintenance phase one by one over three months, these changes in Eli's behavior went from being exciting indications of emerging symbolic communication to frustrating and discouraging barriers to independent message production. The team members felt like they did not know how to respond to these behaviors in a way that would encourage Eli's independent AAC use. As Elsa put it,

> I wish there was more collaboration with the piece of what he's doing now, and keeping up with behaviors, and how to show him or redirect him.[73] He tried passing [the device] to me and then I would stop him, like I would hold it before he could [pick it up]. Then, he was just using his voice, like he was trying to tell me "no." He was yelling at me. So, yeah, it's just, I probably did so many things wrong.[74]

Nina and Elsa also noted concerns about Eli's fine motor skills and how they were impacting his use of his AAC system. Throughout these months, Eli rarely isolated his pointer finger independently to touch his device.[75] Instead, he would rest his open hand on the key guard, letting multiple fingers touch multiple symbols at once. This led to frustration with the PODD for Compass app's design features, particularly that navigating back to the home page was difficult after selecting a message.[76]

Mixed methods explanation: Maintenance.

After receiving this supports package:
The team's functioning was precariously maintained but threatened,
even as they maintained integrated, consistent, skillful use of the AAC instructional strategies,
because
Eli's communication behaviors plateaued
and were plagued by system issues and increasing prompt dependency.

By the time Jane reached performance criteria signaling the end of one-on-one coaching (Intervention 1), Eli's communication behavior had plateaued. During the months when the team members had been receiving one-on-one coaching, he had shifted from using nonsymbolic

[73] Elsa's Post-I1 Interview lines 480-483.
[74] Elsa's Post-I1 Interview lines 85-95.
[75] Observations; Field Notes 11/17.
[76] Nina's Self-Report Log 11/19; Elsa's Self-Report Log 11/19; Field Notes 11/20.

communicative behaviors, such as reaching or leading people by the hand, as his exclusive form of communication to also handing his AAC device to people or pulling their hands toward his device, as though he were asking for help to make it say what he wanted to say. At first, the team had been excited about this shift, as it signaled Eli's emerging understanding that he could use AAC to express himself.[77] However, when their efforts to encourage him to use his device on his own, rather than seeking their assistance, failed to produce any changes in this behavior, these reports of frustration and feeling stuck emerged.

Clair reported, "It was just kind of tricky when we started to see Eli plateau a little bit."[78] Elsa echoed the sentiment, saying,

> I feel like I'm stuck now, so I feel like it's frustrating. I feel like I'm trying even harder but it's not even in the right way. I'm backing away and I'm allowing Eli to have wait time and he's still not going to his device. [He needs] hand-over-hand [prompting]. So, I think, in a sense, I've helped him, but at the same time, it's frustrating and I don't know [if I'm helping].[79]

The data we collected for the single-case study supported the team's perceptions of a plateau. In fact, based solely on the single-case data shown in Figure 9, it seemed as though Eli's communication was actually declining, as the number of times he babbled with his device (see green bars) and the overall number of times he communicated in any way declined after coaching ended with Jane. Lizzy noted,

> When I'm trying to use the communication device, sometimes he just doesn't really seem interested in it at all anymore. Whereas before, he really would try to take it from me and it was like we were both focused on the AAC.[80]

[77] Nina's Self-Report Logs 12/10, 2/27, Final Interview lines 12-13, 1052-57; Clair's Self-Report Log 2/22, Final Interview lines 4, 668, 691; Elsa's Final Interview lines 13-17, 58-60, 636; Jane's Self Report Logs 2/18, 2/26, Final Interview lines 136-38, 889-93; Lizzy's Self-Report Log 1/24, Final Interview lines 70-76, 415-16, 663.
[78] Clair's Final Interview lines 331-337.
[79] Elsa's Final Interview lines 583, 593-600.
[80] Lizzy's Final Interview lines 55-57.

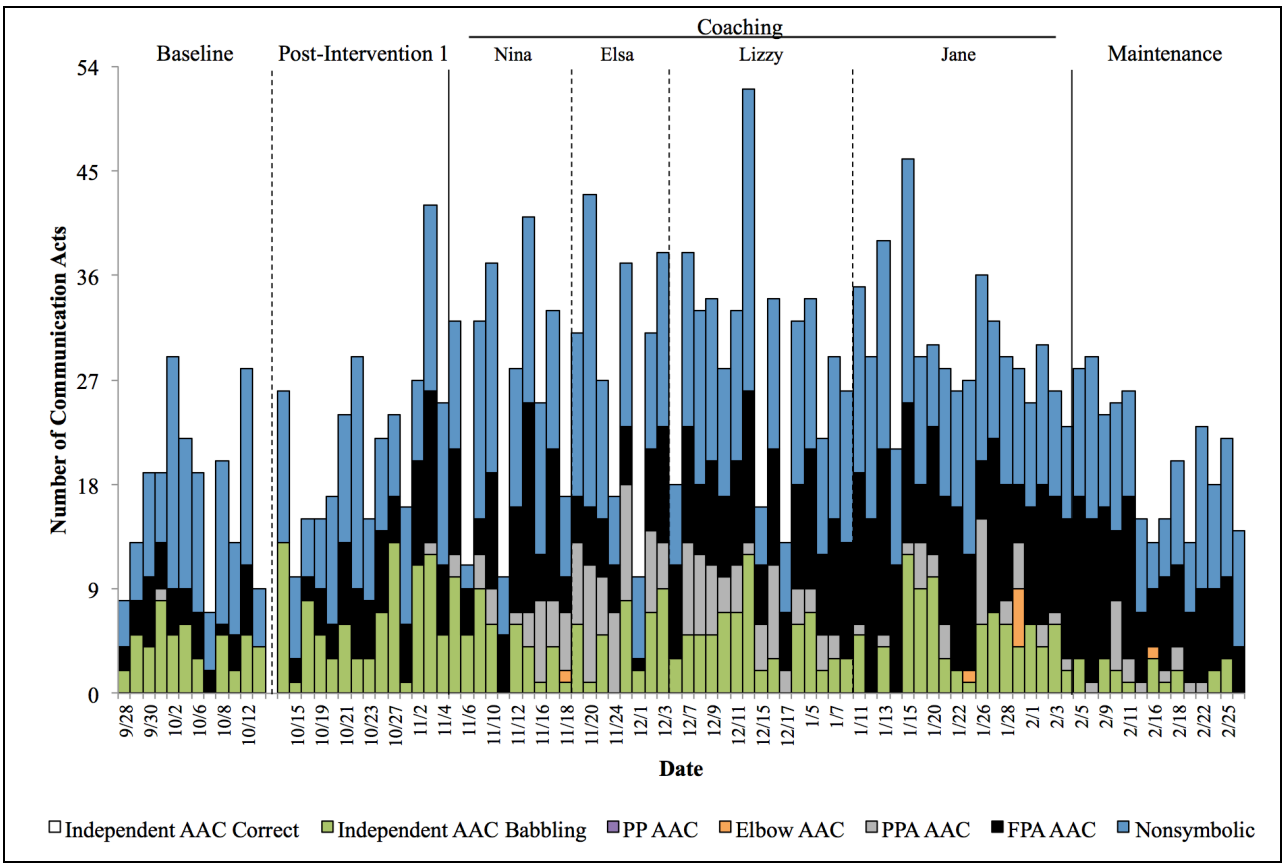


Figure 9. Eli's communication behaviors across the study. Each bar represents the number of times Eli used a particular topography of communication act across all team members and routines each day during the study. PP is point prompt; PPA is partial physical assistance; FPA is full physical assistance.

In spite of this, the team members pressed on, continuing to consistently and skillfully integrate the instructional strategies into their routines with Eli. The team members reported that they continued to (a) make sure Eli's AAC system was always available to him and integrated into his day,[81] (b) use the strategies accurately and across settings,[82] and (c) feel confident in their ability to use the instructional strategies.[83] The single-case data supported these claims, as the team members maintained high-fidelity use of most-to-least systematic prompting (see

[81] Nina's Final Interview lines 36-8, 188-201, 227-8, 1022-9, 1221-8, Self-Report Logs 12/10, 17, 1/28, 2/4, 12; Clair's Final Interview lines 51, 315, Self-Report Log 12/4; Elsa's Final Interview lines 105-7; Lizzy's Final Interview lines 275-80, 429-33, 700, Self-Report Log 1/24, 30, 2/14, 22; Jane's Final Interview lines 497-500.
[82] *Nina's Final Interview lines 363, 364, 1310-12; Clair's Final Interview 61, 128, 516, 677, 706; Lizzy's Final Interview lines 826-34, 700, 900-3; Jane's Final Interview lines 468-74, 755-9, Self-Report Log 2/18; Figures 10-15*
[83] Nina's Self-Report Log 12/17; Clair's Final Interview lines 49, 96, 177, 676, 700; Lizzy's Final Interview lines 275-80, 635-49; Jane's Final Interview lines 291-7, 784-8.

Figure 6) and continued to balance the use of the three strategies within sessions at similar rates and variability as they had during coaching. Figure 8 displays the rates of strategy use for each team member across the duration of the study. As shown in this figure, after coaching ended, little change in rate or variability is observable. As Elsa put it,

> I think everyone was so aware of what they were doing. Once they were coached, I felt like there weren't many questions. If there were questions, it was because of Eli's new behaviors [handing or pulling adults' hands to device; grabbing/fighting for device] or technical issues with PODD.[84]

These questions about how to respond to Eli's changing behavior were critical. The team identified three distinct challenges that were plaguing them as they tried to use the instructional strategies and respond to Eli's unchanging (or declining) communication behavior: (a) limitations within the PODD for Compass app, (b) Eli's fine motor skills, and (c) Eli's prompt dependency. First, navigation features inside the PODD for Compass app made it challenging for the team members to teach Eli how to locate vocabulary. Elsa shared,

> I would say that would be the biggest barrier, the navigation on PODD with finding how to get back to the main page. I would say the navigation piece for sure on moving around page to page, the sequencing, and just the [lack of] consistency of [how to locate a word]. But, the button size is pretty big, so that's nice for Eli with his developing or emerging finger isolation.[85]

Only in late December did Eli begin to show signs of isolating his pointer finger to touch his device,[86] and he never consistently displayed this fine motor skill during the study.[87] This compounded the challenges with the app's navigation features, as Eli frequently touched multiple symbols at once, requiring the adult to navigate back to the home page, often losing Eli's attention and interest in the process. "I'm finding that, in the length of time it takes to navigate back to the home page after a mishit, Eli often loses interest in whatever we were about

[84] Elsa's Final Interview lines 106-107.
[85] Elsa's Final Interview lines 469-505.
[86] Nina's Self-Report Log 12/10.
[87] Nina's Final Interview line 683-9, Clair's Final Interview line 304; Elsa's Final Interview lines 54-4.

to talk about."[88] Finally, the team was concerned about the prompt dependency Eli had developed, insisting on handing the device to them or pulling their hand to the device for assistance rather than touching the device on his own.[89]

The plateau and these plagues loomed large, threatening the team's functioning. First, they threatened the team members' sense of advocacy and ability to problem-solve. Clair said,

> It's frustrating. I don't know where to go next, and I feel like, as the speech pathologist, I should have a clear idea of, "This is what we're doing." I feel like I lost a little bit of momentum. But, what was nice was that it wasn't all on me, but there were other members of the team that were also getting frustrated and seeing the same thing. So, I wasn't like, "Ok, I'm alone in this." But, I feel bad that I don't have an answer for some of those [concerns].[90]

Elsa put it this way: "I feel like, well, like I'm stuck now. I feel like it's frustrating. I'm at this point where [I'm] frustrated with his PODD and it's hard to move past something. It kind of just burns you out."[91] Jane also noted,

> He hands you his iPad, you do the [model], and then that's it. He's grabbing it away and he doesn't want you to [touch it]. And he was never like that before. He always let me do it. But, he still want the help, he still wants everything. I can't really figure that out.[92]

Nina was also feeling less optimistic, sharing,

> I try not to beat myself down with this, but I know for sure that I could do better in supporting Eli with AAC. I know that I'm doing a lot, but it's a process. It's a balancing act. I think Eli's an emerging communicator, . . . emerging communicator is a really good word for him. And I think he's going to stay here for a while. I wish that he would do better, but I can't really expect him to do better. . . . [He's showing] much more intent, there's much more predictable behavior, but once we figure out what motivates him and how to jump to that next stage, I think we're going to be better. I told you from the beginning, don't expect expressive language.[93]

[88] Clair's Self-Report Log 11/24.
[89] Nina's Self-Report Log 2/27; Clair's Final Interview lines 11, 207.
[90] Clair's Final Interview lines 332-7.
[91] Elsa's Final Interview lines 583-9.
[92] Jane's Final Interview lines 136-41.
[93] Nina's Final Interview lines 1018-19, 1023, 1032, 1076, 1081-82, 1086-89.

Here, a second threat to team functioning emerged. The philosophical differences between Clair and Nina became clearer, threatening to erode the bedrock on which some of the team's functioning had been resting. While Nina's instinct was to focus on providing Eli with extensive receptive input via aided AAC modeling,[94] Clair wanted to continue to find ways to support autonomous expressive language and operational competence.[95] This difference in philosophy led to different ideas about how to best address the plateau and plagues, introducing the final threat to team functioning: the potential for interpersonal conflict.

As the team faced these challenges, they were protected by (a) their increased commitment to Eli's AAC success,[96] (b) their increased training and support in AAC,[97] (c) the positive changes in the contexts under which they were doing this work (i.e., shared vision, common short-term goals, role definition),[98] and (d) the strong relationships they had built with one another[99] that participating in the team meeting (Intervention 1) and one-on-one coaching (Intervention 2) had fostered.

Social validity of the supports package.

"I'm very happy we did it. It was less work than I expected and I think, for Eli, it's totally worth it because otherwise [AAC] would be used here and there, but I don't think it would be used as much as it is now."[100]

We assessed the social validity of the supports package by asking team members to report on their perceptions of its goals, procedures, and outcomes during interviews at three different

[94] Nina's Final Interview lines 1081-1089.
[95] Clair's Final Interview lines 667-669.
[96] Nina's Final Interview lines 408-17, 560-6, 628-30, 965-73; Clair's Final Interview lines 85-9, 138, 187-9, 332-7; Lizzy's Post-I1 Interview lines 214-28, 312, Final Interview lines 409-17, 500-4; 535-9; Jane's Post-I1 Interview lines 203-8, 283-5, Final Interview line 491-500.
[97] Nina's Final Interview lines 172-9, 209; Elsa's Post-I1 Interview lines 254-5, 305-7, 353-6.
[98] Nina's Final Interview lines 1000-9; Clair Final Interview 182-3; Elsa's Final Interview lines 563-79; Lizzy's Final Interview lines 623-6; Jane's Final Interview lines 552-3, 622-5, 689-721.
[99] Nina's Final Interview lines 242-53, 484-6, 493-517, 954-7; Clair's Final Interview lines 274-5, Jane's Final Interview lines 788-95; Lizzy's Final Interview lines 241-3, 285-8.
[100] Nina's Final Interview 1438-43.

time points during the study: (a) after participating in Intervention 1, (b) after participating in Intervention 2 (Clair was excluded from this), and (c) at the end of the study. We then summarized their responses to identify strengths and weaknesses of the supports package, and distinguishing these by consensus versus divergent opinion. In all, the team members perceived the goals, procedures, and outcomes of the supports package to be socially valid, but with noted room for improvement.

Goals. The goals of the supports package were to (a) improve team functioning around AAC, defined as working together and individually toward a common goal; (b) improve team members' instructional competence with AAC; and (c) support the child's AAC learning and communicative competence. I asked each team member if (a) these were important goals to have, and (b) if the supports package achieved those goals.

Across all participants and time periods, the participants reported these goals to be important and relevant to Eli, to their jobs, and the goals they believed should be addressed over other possible goals. Clair summarized the team's perceptions well when she said,

> Student growth is always the main goal, so getting the whole team on board, the people that are with [Eli] more than I can be with him, that's definitely going to help. And that is usually a big hurdle with AAC, getting everyone on board. So, I think that was awesome. Having that instructional piece where they know what to do with him and then also the buy-in is huge. Buy-in and knowing what to do, I can't think of anything that would trump that.[101]

Also, Elaine, the COTA who only participated in Intervention 1, related, "I feel like all this training and stuff is what makes the group more cohesive. Team members need to realize that we operate as a team but each member does have their specific role."[102]

Of note, both Lizzy and Jane initially questioned the importance of these goals, but after participating in both components of the supports package and reflecting on their experience,

[101] Clair's Final Interview lines 85-89.
[102] Elaine's Post-I1 Interview lines 81-83.

decided that these goals were important but remained skeptical that they truly belonged on the team. Also of note, multiple team members from the school talked about how they were using what they learned with other students who used AAC.[103]

Procedures. I asked the participants the following questions about the procedures for Interventions 1 and 2 in the interviews immediately following each intervention: (a) Were the procedures appropriate and worthwhile? (b) Is there anything you would change, skip, or do differently? (c) Is there anything you like and would keep if you had to do it again? Then, in the final interview, I asked participants to think about the procedures for both interventions and the sequence of those events and asked: (a) Were those procedures appropriate, worthwhile, and appropriately sequenced? Why? (b) Were there things you would add, omit, or alter and why?

Overall, most team members reported that the procedures were acceptable, feasible, and worthwhile, but each offered suggestions for improving the procedures of both interventions (see Table 8). For Intervention 1, the team members suggested changes for before, during, and after the team meeting. First, all team members noted that, because attending the meeting was not required, two paraprofessionals chose not to attend. Clair and Elsa strongly encouraged them to attend, included them in conversations about scheduling the meeting, and I offered to pay them for their time from funding for this research, but they still chose not to come to the meeting. As a result, already-existing tension between these paraprofessionals and the rest of the team continued and was, quite possibly exacerbated and Eli received inconsistent AAC support.[104] Thus, the team felt that participation should be mandatory or that team members who could not attend should have a way to make up for their absence. Some team members also suggested that

[103] Clair's Final Interview line 324; Elsa's Final Interview lines 131-3, 360-5; Lizzy's Final Interview lines 783-4, 887-8.
[104] SLP Observations starting 10/21; Jane's Final Interview lines 286, 428-39, 505-25, 774-80; Elsa's Final Interview lines 228-43; Elaine's Post-I1 Interview, pp. 2-3.

sending the scripted agenda for the team meeting in advance would help everyone be prepared for the meeting.[105] During the meeting, team members felt that more time should have been allotted for training in instructional strategy use.[106] Elaine suggested breaking the meeting into two one-hour sessions to make it easier for everyone to stay focused.[107] Most team members felt that, after this long structured team meetings, holding additional, shorter team meetings to share celebrations of progress and work together to problem solve would have enhanced both their functioning as a team and the effectiveness of their instruction.[108]

Table 8

Suggested Changes to Procedures in the Supports Package

Intervention	Suggested Changes
1. Structured Team Meeting	• Before: Require all team members to attend; send agenda for review • During: Allot more time for training in instructional strategy use; consider two shorter meetings instead of one 2-hour meeting • After: Repeat in short form for celebrations and problem-solving
2. One-on-one Coaching	• Begin soon after the team meeting • Provide coaching in multiple routines • Encourage peer coaching and feedback • Distribute coaching sessions over time

The team members all reported that one-on-one coaching was very valuable and important in figuring out how to best work with Eli in their times with him. However, many features of the research study and design negatively impacted their experience with these procedures. First, the team members wanted coaching to begin soon after the team meeting (Intervention 1), but because of the single-case design, they were required to wait varied lengths of time. Second, they suggested that coaching be provided in a variety of routines. Again,

[105] Nina's Final Interview lines 170-2.
[106] Nina's Post-I1 Interview lines 70-2; Elaine's Post-I1 Interview lines 161-162.
[107] Elaine's Post-I1 Interview, lines 141-152.
[108] Final Interviews: Nina lines 251-3; Elsa lines 181-5; Clair lines 69-70; Lizzy line 222.

because I wanted to evaluate the extent to which they were able to generalize the strategies to other routines without coaching, this was not permitted. Third, to maintain experimental control over the interventions' effects, I asked the team members not to discuss the strategies with other team members until that person had received coaching. They graciously complied but reported that having opportunities to provide one another with feedback and support was more desirable. Finally, again based on the single-case design and time limits of this study, each team member received coaching until she reached established performance criteria for instructional strategy use and then did not receive coaching again. Several team members reported that they would have preferred distributing coaching sessions over time to help them problem solve and maintain their instructional skills.

Of particular importance for Intervention 2, Elsa indicated that she appreciated that she received coaching prior to her paraprofessionals, saying, "I liked how I was first. That way, I was able to answer questions. Obviously, before I can teach my paraprofessionals, it's nice to be able to collaborate with you [researcher] and Clair."[109]

*Accountability***.** All of the team members talked about the important role that video recording their interaction with Eli played in both their own outcomes and Eli's experience. The camera served as a reminder to work on AAC and to use the strategies, and each team member admitted that, unfortunately, their use of the strategies and general attention to AAC was likely to fade without it. During her interview after the study had ended, Lizzy confessed, "Yeah, you know, honestly, I am using [AAC] less. As far as greetings and salutations, I feel like I still use those a lot. I'm still mainly using it for that, not as much for requesting."[110] While discussing this during her final interview, Nina decided that she might see if the school team would be willing to

[109] Elsa's Final Interview lines 171-3.
[110] Lizzy's Final Interview lines 361-9.

continue to video record once a week to help maintain AAC as a priority.[111] Elsa brainstormed, "Maybe I could give [the paraprofessionals] a data sheet and they could record how many opportunities, or attempts, or whatnot."[112]

*Impact of research***.** Nina indicated that the research study impacted the way she responded to Eli, which may have, in turn, impacted his communication outcomes. She said,

> You don't want to be doing much things differently because you're part of the research project. You don't want to create some other strategies and throw away the whole data. So, maybe I do something differently one of the days when the camera is not on, but when the camera is on, I feel kind of obligated to provide you this data.[113]

While looking at graphs of her performance data and Eli's communication behaviors from the single-case study, Nina reiterated, "Probably, Eli got bored with us again and just was ready for something different but we were collecting data [for the research study] so we stuck with what we needed to do."[114]

Outcomes. After participating in Intervention 1, I asked participants how they felt the team meeting had affected (a) the team as a whole, and (b) themselves as members of the team. Then I asked them if those effects were worth the effort the meeting required. After participating in Intervention 2, I asked the participants to share how the coaching affected their interactions with Eli and with other members of the team, and if those effects were worth the effort required of them during coaching. Then, during the final interview, I asked three questions: (a) Did the supports package affect your interactions with Eli? If so, how and why do you think this happened? (b) Did the supports package affect your interactions with other members of the team? If so, how and why do you think this happened? (c) Do you think those effects are worth

[111] Nina's Final Interview lines 597-614.
[112] Elsa's Final Interview lines 334-8.
[113] Nina's Final Interview lines 315-8.
[114] Nina's Final Interview lines 1270-72.

the effort required to participate in the supports package (excluding research activities, such as video recording, online forms, and interviews)?

*Facilitator outcomes***.** The explanatory statements addressed the Facilitator outcomes. All participants reported that these outcomes were worth the effort required to participate in the supports package and that the additional effort required to participate in the research study was minimal and acceptable.

One important Facilitator outcome that was not captured in the explanatory statements was the change in the paraprofessional's perception of their role and membership on the team over time. As Lizzy stated,

> I think at the beginning, I felt like, well, like I'm not that important as a member of the team because I'm just an aide. Like Eli's work with Clair and Elsa would be a lot more important than his work with me. But then, as time went on, I felt like I was, I mean, I was with him so much of the day and I really felt like I was important, you know? The longer the study went on, the more empowered I felt about my part in it.[115]

After participating in the team meeting, Elaine's perception of the outcomes of Intervention 1 echoed the experiences of the Facilitators, particularly around consensus and belonging on the team. She said,

> I think people are going to be more devoted, more on it. Knowing how important [AAC] is, especially to [Eli's] family and to you and to have us all there and to put effort into this. That commitment, being more committed to the device and using it the right way [rather than] saying, "Well, this is how I want to use it."

She also noted,

> I think maybe [it impacted] the aides knowing that they are a huge part of the team. They spend a lot of time with Eli and [the meeting helped them] to see the importance of that. They need all of this knowledge, just like we [the professional staff] do and we do need to all work together. We couldn't do it without them, and, of course, they couldn't do it without us.

[115] Lizzy's Final Interview lines 535-540.

*Child outcomes***.** The explanatory statements also addressed outcomes for Eli. All participants reported that these outcomes, while disappointing, were important, unlikely to have occurred without the supports package, and worth the effort required to participate in the supports and in the research study. Elsa said,

> We would not be where we are today without those supports.[116] I don't think I would have ever identified that in my head, as "This is how we can understand Eli and teach him his AAC." This was awesome to help me [develop] a sense of purpose, I guess. To have that foundation with his communication.[117]

Drawing conclusions. This socially valid supports package, consisting of a structured team meeting and one-on-one coaching in instructional strategies was effective in supporting this educational team's functioning and instructional competence around AAC. The supports package improved the team's functioning, particularly helping to get all team members "on board" with supporting Eli's AAC and committing to a plan for supporting his success. The supports package developed each team member's competence in using three evidence-based instructional strategies within their naturally occurring routines with Eli, simultaneously increasing team members' confidence and comfortability in providing AAC instruction. As a result, the team members supported initial changes in Eli's communicative behaviors toward symbolic AAC use. However, the supports package was not sufficient to sustain team functioning and/or instructional competence, particularly because the team required additional supports to solve problems that arose as Eli's communication behaviors evolved but stopped short of independent, accurate use of his AAC system to communicate.

[116] Elsa's Final Interview line 89.
[117] Elsa's Final Interview lines 202-8.

Chapter 5

Discussion

About a Boy, AAC, and Grown-ups

The purpose of this mixed methods study was to examine three critical aspects of AAC service provision. First, I examined team functioning, defined for these purposes as the extent to which team members work collectively and individually toward a common goal. Second, I examined instructional competence, defined as each team member's ability to apply evidence-based instructional strategies with fidelity, balance the application of different strategies that support different aspects of communicative competence, and do both of these with confidence and comfort across contexts. Third, I examined communication outcomes for the child who was learning to use AAC. To guide this study, I posed the research question:

> In what ways and to what extent was a supports package for a child's educational team effective in supporting (a) the experience and functioning of the team around AAC, (b) competence in AAC instruction, and (c) the child's communication skills?

Then, to answer this question, I recruited one boy, Eli, who was learning to use AAC and his educational team: his mother and his speech therapist, special education teacher, and two paraprofessionals from his school team. I provided these adults with a supports package that consisted of a structured team meeting and one-on-one coaching. With a team of researchers, I conducted a mixed methods analysis of multiple data sources, using both single-case design and case study methodologies in this process. Through this analysis, we built a series of explanations about how the supports package affected the team and Eli, using understanding constructed by the participants' and the research team's interpretations (case study) and observed and measured changes in the participants' behavior (single-case study) to defend our conclusions.

In answering the research question, responding to "in what ways" represents our findings and "to what extent" captures limitations of the supports package. Next, I summarize the findings

and limitations pertaining to the three aspects of AAC service provision. Then, I outline additional limitations to this research and close with a discussion of its implications for research and practice.

Effects on team functioning. We found that the supports package was effective in getting the team members who participated in the research project on board with supporting AAC for Eli, helping them to function better as a team, identify both short- and long-term goals, and work toward those goals. If AAC is the boat that will carry Eli down the Development River toward the horizon of communicative competence, the team meeting served as a rope with which to pull team members to the boat and a ladder by which they climbed aboard. It also served as a compass, directing the team's collective and individual efforts toward that horizon. In keeping with the work of Tuckman and Jensen (1977) and King-Sears et al. (2015), by engaging in intentional activities (i.e., the supports package) to support the team's forming, storming, and norming, the team was able to perform; that is, the team reached a place where all participating members were on board and engaged in the activities the team had decided would best support Eli's communication development. In addition, the team members engaged in the activities that promote true partnership between educational professionals and families outlined by Turnbull et al. (2015), which impacted their overall functioning.

However, two features limited the effects of the team's efforts. First, as a function of both the protocol for the protection of human subjects in this research project and Eli's school's policy, members of Eli's team were not required to participate in the activities of the supports package. Multiple members of his educational team elected not to participate, including two paraprofessionals who spent time with him every day. This led to tensions within the team that impacted overall team functioning. The extent to which this affected Eli's communication

development is unknown, but other researchers have discussed the value of having all members of the team committed to the child's AAC success (Bailey, Stoner, et al., 2006; Calculator, 2014; Parette et al., 2000; Stoner, Angell, & Bailey, 2010; Sutherland et al., 2005).

Second, the supports package included only one team meeting and coaching to only one set of performance criteria. The team members expressed dissatisfaction with this, feeling that follow-up team meetings and ongoing coaching would have helped them better support Eli's ongoing communication development. In a sense, this lack of ongoing support had some team members thinking about abandoning ship, threatening the ongoing functioning of Eli's team. Again, this is consistent with the findings of other researchers who have noted the value of ongoing supports (Bailey, Stoner, et al., 2006; Balandin & Iacono, 1998; Barker et al., 2013; Baxter et al., 2012; De Bortoli et al., 2014, 2012; Johnson et al., 2006; King-Sears et al., 2015; Kretlow et al., 2011; Parette et al., 2000; Simpson et al., 1998)

Effects on instructional competence. We found that the supports package was effective in teaching all participating team members to use most-to-least systematic prompting with high fidelity, use three evidence-based instructional strategies more proportionally instead of relying heavily on only one, and feel comfortable and confident when using these strategies with Eli across their daily routines. We came to think of these instructional strategies as the paddles the team members were using to row the boat toward their destination. The team meeting ensured that all the team members had a paddle, and the one-on-one coaching served as rowing lessons, helping each member paddle in synchrony with the rest of the team. This team's experience adds support to the extensive research supporting both training and embedded coaching to facilitate adult learning and mastery of skills (Fixsen et al., 2005; Joyce & Showers, 2003; Kent-Walsh & McNaughton, 2005; Knowles et al., 2015).

However, we identified four factors that limited the team's instructional competence. First, as previously noted, not all team members were required to participate. In addition to impacting team functioning, this also impacted the consistency of the AAC instruction and support Eli received. Again, the impact of this on his communication is unknown. Second, we found evidence that, although the supports package helped the participating team members develop basic proficiency with the three instructional strategies, this was not enough to support them in problem solving and adjusting their instruction as Eli's communication skills changed. When Eli began to hand his AAC device to people or pull their hands to his device when he wanted something, the team members reported that they felt unsure of how to respond and needed additional supports to effectively adjust to this change. This change in Eli's behavior was like hitting the rapids on the river, where adjustments to paddling are required to successfully navigate through the treacherous waters. The supports package, however, was insufficient in building the team's competence to make such adjustments to how they wielded the instructional strategies. This also revealed a third factor that limited instructional competence, the distributed nature of the coaching. Because of the single-case design used in this study, team members had to wait to receive one-on-one coaching until other team members met performance criteria for instructional competence. Consequently, some members were still waiting to receive coaching when Eli's behaviors began to change, and the members who had to wait for coaching spent months using the instructional strategies at sometimes lower rates and with poor fidelity (see especially Lizzy and Jane). In effect, they had not had support in learning basic strokes before needing to paddle through the rapids. To preserve the integrity of the single-case design, I chose not to adjust the content of the coaching to accommodate the changes in Eli's behavior, choosing instead to continue coaching in basic paddling techniques in spite of the rushing water. It is

likely that this impacted Eli's communication, although how and to what extent it did so is unknown. Taken together, these limitations raised a final factor that may have limited the team's instructional effectiveness, even though they developed basic competence. There are many instructional strategies for supporting AAC development. Did we select the best ones, the "right" ones for supporting Eli's AAC learning? Perhaps this team needed to build competence with entirely different paddles. This highlights the need for further research and clearer guidelines for determining which instructional strategies are best suited for supporting different aspects of communicative competence, how to best combine and balance strategies to support holistic skill development, and what individual and contextual factors influence these decisions (Light & McNaughton, 2014). To date, guidelines for best practices in AAC instruction that exist are broad and have limited guidelines as to their application (e.g., Calculator & Black, 2009; Schlosser & Sigafoos, 2006; Snell et al., 2006).

Effects on Eli's communication. We saw changes in Eli's communication during this study that both the research team and Eli's educational team attributed to the improved functioning and instructional competence of his team. Namely, Eli came to see his AAC device as his own and indicate that he understood its purpose as a means of expressing himself. He made progress toward the horizon of communicative competence. However, the team's efforts, influenced by the supports package, did not help Eli develop autonomous, accurate use of his AAC to produce intentional messages yet. In fact, by the end of the study, the team members were reporting that Eli was showing signs of frustration with AAC. We identified three possible limitations that may have influenced this outcome: (a) limitations in the supports package, (b) limitations in his AAC system, and/or (c) unknown influencing factors. First, Eli's communication progress may have been limited by the limitations to the supports package I

identified in the previous two sections. For example, had we selected different instructional strategies around which to build team functioning and instructional competence, perhaps we would have seen him develop autonomous, intentional communication via AAC. Second, we identified limitations in his AAC system that may have influenced his performance, including the skills required to navigate the device to locate desired vocabulary and the fine motor skills needed to accurately select icons within the system. Finally, we are aware that, as in all human endeavors, there are unknown factors that impact outcomes. These unknown unknowns may account for all or some of Eli's communication progress. Likely, it is a combination of multiple limitations that account for the limits to his progress, with miles of river to traverse before arriving at his destination.

Additional limitations. As with all research, there are limitations that influence the interpretation and usefulness of the findings presented here. In addition to the limitations addressed in the previous sections, I identified limitations to this study's (a) methods, (b) transferability to other teams and children who are learning to use AAC, and (c) practical application.

Methods. I used two methods in this study and mixed these methods to draw conclusions. Conclusions from the single-case multiple baseline across participants design are limited by at least three features. First, in the visual analysis of the primary dependent variable (i.e., high-fidelity use of systematic prompting), changes in Nina and Elsa's behavior were observed prior to receiving coaching (independent variable). Although the changes in trend, level, and variability for both do not indicate that either was likely to meet performance criteria without coaching, participating in the team meeting appears to have produced some changes in their behavior (although functional relation cannot be claimed). Second, I did not establish

experimental control over the secondary dependent variables in the single-case study (i.e., rate of strategy use, child communication). Finally, interobserver agreement fell below 80% for some categories for some participants (see Table 7).

Conclusions from the case study are limited by at least two features. First, the research team conducting the analysis was small, consisting primarily of a single graduate assistant and myself. The graduate assistant had limited pre-existing knowledge and experience with AAC and with research, influencing her perceptions and interpretations of the data sources. Alternately, my experience and training in both AAC and research strongly influenced my perceptions and interpretations of the data sources, and, likely, strongly influenced the graduate assistant's thinking. Second, rival explanations for the findings we present exist. Although we gave great effort to attending to possible rival explanations and presenting the best-supported explanation, we cannot disprove other possibilities. Of particular note is the possibility that this team's functioning and instructional competence could have flourished without the supports package because they were moderately functional and engaging in basic AAC supports within the first month of working together. If so, the team might also have avoided some of the challenges posed by the supports package (e.g., not having all members of the team participating). Although the team members, including Clair who had led and was concurrently leading other efforts to support AAC with this educational team, attributed their progress to their participation in the supports package, we cannot know what would have happened in its absence.

Transferability. This study represents the experience of one team working with one child. The transferability of our findings is thus limited. When considering possible connections to other contexts, the following are key considerations. First, both Eli's mother and SLP were deeply committed to AAC prior to receiving the supports package. Second, Nina and Clair

worked well together and were largely in agreement about AAC supports. Third, this team had many existing resources to support their success, including Eli's family's ability to pay for AAC equipment out of pocket, a school administration that was neither actively supportive nor prohibitive of AAC supports, and existing rapport and trust among several members of the team. In addition to these existing supports, the research activities added accountability for AAC (e.g., video recording, weekly report logs, researcher presence), and I developed a strong, positive relationship with the team members that may have influenced their commitment to AAC, responses in interviews and on the weekly self-report log, and other aspects of this study.

Practical application. Finally, I directed the activities of this project, acting as the coach in Intervention 1 and collaborating with Clair to determine instructional strategies. This limits what we can deduce about how the supports package would function without external supports and/or without a researcher and SLP with experience and expertise in AAC for children with intellectual disability and complex communication needs.

Implications for Research and Practice

This study poses interesting implications for both research and practice around supporting educational teams (including families) to support AAC for children with intellectual disability and complex communication needs.

Research implications. First, our mixed methods approach allowed us to examine the complex structures and experiences that make up human communication and AAC supports. Other researchers may find similar benefits from adopting mixed methods and exploring other methods and methodologies that can be applied to explorations in this area.

Second, additional research is needed to better understand best practices for applying evidence-based practices with this population for the purposes of supporting long-term

communicative competence (Light & McNaughton, 2014). Developing guidelines for what instructional practices are best suited for addressing which aspect(s) of communicative competence, including recommendations for identifying for whom these practices are best suited, may help practitioners develop more efficient and effective support plans for children learning to use AAC. Furthermore, research examining optimal proportions of instructional strategies is needed to guide practice. In this study, we assumed that a more equal use of the three target instructional strategies was ideal but this was based on logic rather than evidence.

Third, future researchers examining the supports package provided to Eli's team should consider making the suggested changes to the structured team meeting and one-on-one coaching process, implementing the revised supports package, and reevaluating its effectiveness. In addition, future replications would benefit from using an experimental design that allowed for more timely and flexible delivery of the supports to all team members.

Practice implications. Through this study, we identified preliminary evidence that the structured team meeting promoted both team functioning and instructional competence by guiding the team through the process of articulating a long-term vision for the child's AAC outcomes, developing a plan to address the short-term goal to begin the process of achieving the long-term goals, and providing training in the instructional strategies to be used in addressing the short-term goals. Meeting as a team and using a scripted agenda to ensure these key features are addressed may be beneficial to other teams. When doing so, we highly recommend ensuring that all members of the team participate to ensure instructional consistency for the child and facilitate increased commitment from all team members to promote team functioning.

We also found preliminary evidence that team members needed one-on-one coaching to develop proficiency and confidence when instructing and supporting Eli and his AAC. This

finding is consistent with other research, indicating that teams may benefit from ensuring that its members have access to such embedded support (Fixsen et al., 2005; Joyce & Showers, 2003; Kent-Walsh & McNaughton, 2005; Knowles et al., 2015). One possible option for doing this is for school-based speech therapists to use their service minutes dictated by the child's IEP to provide coaching to other adult team members who regularly spend time with the child.

Finally, during this study, we experienced setbacks. To promote ongoing team functioning and persistence, we suggest that teams begin the process of supporting AAC expecting to experience many highs and lows—the dangerous rapids and discouraging shallow waters that are sure to appear on the journey. To help the team persist through these times, the participating team in this study felt that regular team meetings (perhaps two or three each school year) and ongoing coaching would help the team problem-solve and continue to function and provide effective instruction. Researchers have also suggested that such ongoing and iterative supports are necessary for long-term team functioning and achieving goals (Bailey, Stoner, et al., 2006; Balandin & Iacono, 1998; Barker et al., 2013; Baxter et al., 2012; De Bortoli et al., 2014, 2012; Johnson et al., 2006; King-Sears et al., 2015; Kretlow et al., 2011; Parette et al., 2000; Simpson et al., 1998). Furthermore, we recommend careful review of the AAC system to identify potential barriers to the child's likelihood of experiencing early, autonomous, accurate communication so that adjustments and corrections can be made to support these experiences.

Paddling Toward the Horizon

Eli's story does not end here. Nina, Clair, Elsa, Lizzy, Jane, and many others are likely still paddling as you read this. The journey to communicative competence for children like Eli who have complex communication needs is a long and uncertain one, full of dangerous rapids and depressing shallow pools appearing between stretches of steady progress. In this study, we

identified two supports that helped make a small part of that journey a bit easier. The team meeting helped get everyone on board with Eli's AAC and set their sights on the horizon of communicative competence through AAC. One-on-one coaching helped each member fulfill her commitment to supporting Eli by developing foundational instructional competence. Yet, these supports were not enough to get Eli and his team to their destination. And so, the journey continues.

References

**Alant, E., Champion, A., & Peabody, E. C. (2012). Exploring interagency collaboration in AAC intervention. *Communication Disorders Quarterly*, *34*, 172–183. doi:10.1177/1525740112455432

American Association on Intellectual and Developmental Disabilities (AAIDD). (n.d.). *Frequently asked questions on intellectual disability.* Retrieved from http://aaidd.org/intellectual-disability/definition/faqs-on-intellectual-disability#.VYGX7-tMGQm

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Washington, DC: Author.

American Speech-language Hearing Association (ASHA). (n.d.) *Augmentative and alternative communication (AAC).* Retrieved from http://www.asha.org/public/speech/disorders/AAC/

American Speech-Language-Hearing Association. (1993). *Definitions of communication disorders and variations* [Relevant Paper]. Available from www.asha.org/policy.

American Speech-Language-Hearing Association. (2004). *Roles and responsibilities of speech-language pathologists with respect to augmentative and alternative communication: technical report* [Technical Report]. Retrieved from http://www.asha.org/policy/TR2004-00262/#sec1.3

*Angelo, D. (2000). Impact of augmentative and alternative communication devices on families. *Augmentative & Alternative Communication*, *16*, 37–47. doi:10.1080/07434610012331278894

*Bailey, R. L., Parette, H. P., Stoner, J. B., Angell, M. E., & Carroll, K. (2006). Family members' perceptions of augmentative and alternative communication device use. *Language, Speech, and Hearing Services in Schools*, *37*, 50–60. doi:10.1044/0161-1461(2006/006)

*Bailey, R. L., Stoner, J. B., Parette, H. P., & Angell, M. E. (2006). AAC team perceptions: Augmentative and alternative communication device use. *Education and Training in Developmental Disabilities*, *41*, 139–154.

*Balandin, S., & Iacono, T. (1998). AAC and Australian speech pathologists: Report on a national survey. *Augmentative and Alternative Communication*, *14*, 239–249. doi:10.1080/07434619812331278416

*Barker, R. M., Akaba, S., Brady, N. C., & Thiemann-Bourque, K. (2013). Support for AAC use in preschool, and growth in language skills, for young children with developmental disabilities. *Augmentative and Alternative Communication (Baltimore, Md. : 1985)*, *29*(4), 334–46. doi:10.3109/07434618.2013.848933

*(**)Batorowicz, B., & Shepherd, T. a. (2011). Teamwork in AAC: Examining clinical perceptions. *Augmentative and Alternative Communication*, *27*, 16–25. doi:10.3109/07434618.2010.546809

*Baxter, S., Enderby, P., Evans, P., & Judge, S. (2012). Barriers and facilitators to the use of high-technology augmentative and alternative communication devices: A systematic review and qualitative synthesis. *International Journal of Language & Communication Disorders*, *47*, 115–29. doi:10.1111/j.1460-6984.2011.00090.x

Beukelman, D. R., & Mirenda, P. (2013). *Augmentative and alternative communication: Supporting children and adults with complex communication needs.* Baltimore, MD: Brookes.

***Binger, C., Kent-Walsh, J., Berens, J., Del Campo, S., & Rivera, D. (2008). Teaching Latino parents to support the multi-symbol message productions of their children who require AAC. *Augmentative and Alternative Communication*, *24*, 323–338.

***Binger, C., Kent-Walsh, J., Ewing, C., & Taylor, S. (2010). Teaching educational assistants to facilitate the multisymbol message productions of young students who require augmentative and alternative communication. *American Journal of Speech-Language Pathology*, *19*, 108–120.

Binger, C., & Light, J. (2007). The effect of aided AAC modeling on the expression of multi-symbol messages by preschoolers who use AAC. *Augmentative and Alternative Communication (Baltimore, Md. : 1985)*, *23*, 30–43. doi:10.1080/07434610600807470

Binger, C., & Light, J. (2008). The morphology and syntax of individuals who use AAC: research review and implications for effective practice. *Augmentative and Alternative Communication*, *24*, 123–38. doi:10.1080/07434610701830587

Brady, N. C., Bruce, S., Goldman, A., Erickson, K., Mineo, B., . . . Wilkinson, K. (2016). Communication services and support for individuals with severe disabilities: Guidance for assessment and intervention. *American Journal on Intellectual and Developmental Disabilities, 121,* 121-138. doi:10.1352/1944-7558-121.2.121

Brantlinger, E., Jimenez, R., Klingner, J., Pugach, M., & Richardson, V. (2005). Qualitative studies in special education. *Exceptional Children*, *71*, 195. doi:10.1177/001440290507100205

Burns, B. J., Costello, E. J., Angold, A., Tweed, D., Stangl, D., Farmer, E. M., & Erkanli, A. (1995). Children's mental health service use across service sectors. *Health Affairs, 14,* 147-159. doi:10.1377/hlthaff.14.3.147

*Calculator, S. N. (2014). Parents' perceptions of communication patterns and effectiveness of use of augmentative and alternative communication systems by their children with Angelman Syndrome. *American Journal of Speech-Language Pathology*, *23*, 562–573. doi:10.1044/2014_AJSLP-13-0140

****Calculator, S. N., & Black, T. (2009). Validation of an inventory of best practices in the provision of augmentative and alternative communication services to students with severe disabilities in general education classrooms. *American Journal of Speech-Language Pathology*, *18*, 329–42. doi:10.1044/1058-0360(2009/08-0065)

Centers for Disease Control. (2015). *Developmental disabilities.* Retrieved from http://www.cdc.gov/ncbddd/developmentaldisabilities/index.html

Cook, B. G., & Cook, S. C. (2011). Unraveling evidence-based practices in special education. *The Journal of Special Education*, *47*, 71–82. doi:10.1177/0022466911420877

Cook, B. G., & Odom, S. L. (2013). Evidence-based practices and implementation science in special education. *Exceptional Children*, *79*, 135–144. doi:10.1177/001440291307900201

***Dattilo, J., & Light, J. (1993). Setting the stage for leisure: Encouraging reciprocal communication for people using augmentative and alternative communication systems through facilitator instruction. *Therapeutic Recreation Journal*, *27*, 156–171.

*De Bortoli, T., Arthur-Kelly, M., Foreman, P., Balandin, S., & Mathisen, B. (2011). Complex contextual influences on the communicative interactions of students with multiple and severe disabilities. *International Journal of Speech-Language Pathology*, *13*, 422–435. doi:10.3109/17549507.2011.550691

*De Bortoli, T., Arthur-Kelly, M., Mathisen, B., & Balandin, S. (2014). Speech-language pathologists' perceptions of implementing communication intervention with students with multiple and severe disabilities. *Augmentative and Alternative Communication*, *30*, 55–70. doi:10.3109/07434618.2014.881916

*De Bortoli, T., Balandin, S., Foreman, P., Mathisen, B., & Arthur-Kelly, M. (2012). Mainstream teachers' experiences of communicating with students with multiple and severe disabilities. *Education and Training in Autism and Developmental Disabilities*, *47*, 236–252.

Degeneffe, C., & Terciano, J. (2011). Rosa's Law and the language of disability: Implications for rehabilitation counseling. *Rehabilitation Research, Policy & Education*, *25*, 163–172. doi:10.1891/216866511805000966

Dieker, L. A., & Ousley, D. M. (2006). Speaking the same language: Bringing together highly-qualified secondary English and special education teachers. *Teaching Exceptional Children Plus*, *2*, 1–13.

Fenson, L., Marchman, V. A., Thal, D. J., Dale, P. S., Reznick, J. S., & Bates, E. (2007). *MacArthur-Bates communication development inventories: User's guide and technical manual*. San Diego, CA: Brookes Publishing.

Fixsen, D. L., Naoom, S. F., Blase, K. A., Friedman, R. M., & Wallace, F. (2005). *Implementation research: A synthesis of the literature*. Tampa, FL: University of South Florida, Louis de la Parte Florida Mental Health Institute, The National Implementation Research Network (FMHI Publication #231).

Flay, B. R. (1986). Efficacy and effectiveness trials (and other phases of research) in the development of health promotion programs. *Preventive Medicine, 14*, 451-474.

Gast, D. L., & Ledford, J. R. (Eds.) (2014). *Single case research methodology: Applications in special education and behavioral sciences* (2nd ed.). New York, NY: Routledge.

Glennen, S. L., & DeCoste, D. C. (1997). *Handbook of augmentative and alternative communication.* Clifton Park, NY: Delmar Cengage Learning.

*Goldbart, J., & Marshall, J. (2006). "Pushes and pulls" on the parents of children who use AAC. *Augmentative and Alternative Communication*, *20*, 194–208. doi:10.1080/07434610400010960

Greene, J. C. (2007). *Mixed methods in social inquiry.* San Francisco, CA: Jossey-Bass.

Halle, J. W. (1984). Arranging the natural environment to occasion language: Giving severely language-delayed children reasons to communicate. *Seminars in Speech and Language*, *5*, 185–197.

Halle, J. W., Marshall, A. M., & Spradlin, J. E. (1979). Time delay: a technique to increase language use and facilitate generalization in retarded children. *Journal of Applied Behavior Analysis*, *12*, 431–9. doi:10.1901/jaba.1979.12-431

Harris, M. D., & Reichle, J. (2004). The impact of aided language stimulation on symbol comprehension and production in children with moderate cognitive disabilities. *American Journal of Speech-Language Pathology*, *13*, 155–67. doi:10.1044/1058-0360(2004/016)

Hart, B. (1985). Naturalistic language training techniques. In S. F. Warren & A. K. Rogers-Warren (Eds.), *Teaching functional language* (pp. 63-88). Baltimore, MD: University Park Press.

Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional Children*, *71*, 165–179.

**Hunt, P., Soto, G., Maier, J., Müller, E., & Goetz, L. (2002). Collaborative teaming to support students with augmentative and alternative communication needs in general education classrooms. *Augmentative and Alternative Communication*, *18*, 20–35. doi:10.1080/714868359

Individuals with Disabilities Education Improvement Act of 2004, 20 U.S.C. § 1400 et seq. (2004) (reauthorization of the Individuals with Disabilities Education Act of 1990) Retrieved from http://idea.ed.gov/explore/view/p/%2Croot%2Cstatute%2C

Individuals with Disabilities Education Improvement Act Regulations (2006, August). Retrieved from http://idea.ed.gov/explore/view/p/%2Croot%2Cregs%2C

*Johnson, J. M., Inglebret, E., Jones, C., & Ray, J. (2006). Perspectives of speech language pathologists regarding success versus abandonment of AAC. *Augmentative and Alternative Communication*, *22*, 85–99. doi:10.1080/07434610500483588

Joyce, B. R., & Showers, B. (2002). *Student achievement through staff development* (3rd ed.). Alexandria, VA: Association for Supervision and Curriculum Development.

Kazdin, A. E. (2011). *Single-case research designs: Methods for clinical and applied settings* (2nd ed.). New York: Oxford.

Kennedy, C. H. (2005). *Single-case designs for educational research.* New York, NY: Allyn and Bacon.

***Kent-Walsh, J. (2003). *The effects of an educational assistant instructional program on the communicative turns of students who use augmentative and alternative communication during book reading activities* [Dissertation]. The Pennsylvania State University.

***Kent-Walsh, J., Binger, C., & Hasham, Z. (2010). Effects of parent instruction on the symbolic communication of children using augmentative and alternative communication during storybook reading. *American Journal of Speech-Language Pathology*, *19*, 97–107.

Kent-Walsh, J., & McNaughton, D. (2005). Communication partner instruction in AAC: Present practices and future directions. *Augmentative and Alternative Communication*, *21*, 195–204. doi:10.1080/07434610400006646

Kent-Walsh, J., Murza, K. A., Malani, M. D., & Binger, C. (2015). Effects of communication partner instruction on the communication of individuals using AAC: A meta-analysis. *Augmentative and Alternative Communication*. doi:10.3109/07434618.2015.1052153

King-Sears, M. E., Janney, R., & Snell, M. E. (2015). *Collaborative teaming* (3rd ed.). Baltimore, MD: Brookes.

Kirk, S., Gallagher, J., Coleman, M. R., & Anastasiow, N. (2012). *Educating exceptional children* (13th ed.). Belmont, CA: Wadsworth Cengage Learning.

Knowles, M. S., Holton, E. F., III, & Swanson, R. A. (2015). *The adult learner: The definitive class in adult education and human resource development* (8th ed.) [Kindle Version 4.10]. New York, NY: Routledge.

Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Sadish, W. R. (2010). *WWC single-case design technical documentation*. Retrieved from http://ies.ed.gov/ncee/wwc/pdf/wwc_scd.pdf

Kretlow, A. G., Cooke, N. L., & Wood, C. L. (2011). Using in-service and coaching to increase teachers' accurate use of research-based strategies. *Remedial and Special Education*, *33*, 348–361. doi:10.1177/0741932510395397

**Lamontagne, M.-E., Routhier, F., & Auger, C. (2013). Team consensus concerning important outcomes for augmentative and alternative communication assistive technologies: A pilot study. *Augmentative and Alternative Communication*, *29*, 182–9. doi:10.3109/07434618.2013.784927

Light, J. C., & Binger, C. (1998). *Building communicative competence with individuals who use augmentative and alternative communication.* Baltimore, MD: Brookes.

Light, J., & McNaughton, D. (2014). Communicative competence for individuals who require augmentative and alternative communication: A new definition for a new era of communication? *Augmentative and Alternative Communication*, *30*, 1–18. doi:10.3109/07434618.2014.885080

Light, J., & McNaughton, D. (2015). Designing AAC research and intervention to improve outcomes for individuals with complex communication needs. *Augmentative and Alternative Communication*, *31*, 85–96. doi:10.3109/07434618.2015.1036458

*Lund, S. K., & Light, J. (2007). Long-term outcomes for individuals who use augmentative and alternative communication: Part III--contributing factors. *Augmentative and Alternative Communication*, *23*, 323–35. doi:10.1080/02656730701189123

Manolov, R. Solana, A., Sierra, V., & Evans, J. J. (2011). Choosing among techniques for quantifying single-case intervention effectiveness. *Behavior Therapy, 42,* 533-545. doi:10.1016/j.beth.2010.12.003

McConney, A., Rudd, A., & Ayers, R. (2002). Getting to the bottom line: A method for synthesizing findings within mixed-method program Eevaluations. *American Journal of Evaluation*, *23*, 121–140. doi:10.1177/109821400202300202

*McCord, M. S., & Soto, G. (2004). Perceptions of AAC: An ethnographic investigation of Mexican-American families. *Augmentative and Alternative Communication*, *20*, 209–227. doi:10.1080/07434610400005648

*McDonald, R., Harris, E., Price, K., & Jolleff, N. (2008). Elation or frustration? Outcomes following the provision of equipment during the Communication Aids Project: Data from one CAP partner centre. *Child: Care, Health and Development*, *34*, 223–9. doi:10.1111/j.1365-2214.2007.00787.x

*Meder, A. M., & Wegner, J. R. (2015). iPads, mobile technologies, and communication applications: A survey of family wants, needs, and preferences. *Augmentative and Alternative Communication*, *31*, 27–36. doi:10.3109/07434618.2014.995223

Merriam, S. B. (2001). Andragogy and self-directed learning. In S. Merriam (Ed.), *The new update on adult learning theory* (no. 89). San Francisco, CA: Jossey-Bass

Michan, S., & Rodger, S. (2000). Characteristics of effective teams: A literature review. *Australian Health Review*, *23*, 201. doi:10.1071/AH000201

National Core Indicators, T. (2014). *What do NCI data reveal about individuals with intellectual and developmental disabilities who communicatie nonverbally?* Retrieved from http://www.nationalcoreindicators.org/upload/core-indicators/NCI_DataBrief_Jan2014.pdf

National Joint Committee for the Communication Needs of Persons With Severe Disabilities (NJC). (1992). *Guidelines for meeting the communication needs of persons with severe disabilities* [Guidelines]. Available from www.asha.org/policy or www.asha.org/njc.

*Parette, H. P., Brotherson, M. J., & Huer, M. B. (2000). Giving families a voice in augmentative and alternative communication decision-making. *Education & Training in Mental Retardation & Developmental Disabilities*, *35*, 177–190.

*Parette, H. P., Chuang, S.-J. L., & Blake Huer, M. (2004). First-generation Chinese American families' attitudes regarding disabilities and educational interventions. *Focus on Autism and Other Developmental Disabilities*, *19*, 114–123. doi:10.1177/10883576040190020701

Parker, R. I., Vannest, K. J., & Brown, L. (2009). The Improvement Rate Difference for single-case research. *Exceptional Children*, *75*, 135–150.

Parker, R. I., Vannest, K. J., Davis, J. L., & Sauber, S. B. (2011). Combining nonoverlap and trend for single-case research: Tau-U. *Behavior Therapy*, *42*, 284–99. doi:10.1016/j.beth.2010.08.006

Patton, M. Q. (2015). *Qualitative research and evaluation methods: Integrating theory and practice* (4th ed.) [Kindle version]. Los Angeles, CA: Sage.

Pearpoint, J., O'Brien, J., & Forest, M. (1993). *PATH: A workbook for planning positive possible futures: Planning Alternative Tomorrows with Hope for schools, organizations, businesses, families.* Toronto: Inclusion Press.

Porter, G., & Cafiero, J. M. (2009). Pragmatic Organization Dynamic Display (PODD) communication books: A promising practice for individuals with autism spectrum disorder. *SIG 12 Perspectives on Augmentative and Alternative Communication, 18,* 121-129. doi:10.1044/aac18.4.121

Reichle, J., Halle, J. W., & Drasgow, E. (1998). Implementing augmentative communication systems. In A. Wetherby, S. Warren, & J. Reichle (Eds.), *Communication and language intervention series: Vol. 7. Transitions in prelinguistic communication* (pp. 417-436). Baltimore, MD: Brookes.

Reichle, J., York, J., & Sigafoos, J. (1991). *Implementing augmentative and alternative communication: Strategies for learners with severe disabilities.* Baltimore, MD: Brookes.

Robinson, N. B., & Solomon-Rice, P. L. (2009). Supporting collaborative teams and families in AAC. In G. Soto & C. Zangari (Eds.), *Practically speaking: Language, literacy, and academic development for students with AAC needs* (p. 289-312). Baltimore, MD: Brookes.

Romski, M. A., Sevcik, R., Robinson, B., & Bakeman, R. (1994). Adult-directed communications of youth with mental retardation using the system for augmenting language. *Journal of Speech and Hearing Research*, *37*, 617–628.

***Rosa-Lugo, L. I., & Kent-Walsh, J. (2008). Effects of parent instruction on communicative turns of Latino children using augmentative and alternative communication during storybook reading. *Communication Disorders Quarterly*, *30*, 49–61.

Ruble, L. A., Heflinger, C. A., Renfrew, J. W., & Saunders, R. C. (2005). Access and service use by children with autism spectrum disorders in medicaid managed care. *Journal of Autism and Developmental Disorders*, *35*, 3–13. doi:10.1007/s10803-004-1026-6

Rush, D. D., & Shelden, M. L. (2011). *The early childhood coaching handbook.* Baltimore, MD: Brookes.

*Saito, Y., & Turnbull, A. (2007). Augmentative and alternative communication practice in the pursuit of family quality of life: A review of the literature. *Research and Practice for Persons with Severe Disabilities*, *32*, 50–65.

Schalock, R. L., Luckasson, R., Bradley, V., Buntinx, W., Lachapelle, Y., . . . Wehmeyer, M. L. (2012). *User's guide to intellectual disability: Definition, classification, and systems of supports.* American Association on Intellectual and Developmental Disabilities.

****Schlosser, R. W., & Sigafoos, J. (2006). Augmentative and alternative communication interventions for persons with developmental disabilities: Narrative review of comparative single-subject experimental studies. *Research in Developmental Disabilities*, *27*, 1–29. doi:10.1016/j.ridd.2004.04.004

Schreibman, L., Dawson, G., Stahmer, A. C., Landa, R., . . . Halladay, A. (2015). Naturalistic developmental behavioral interventions: Empirically validated treatments for autism spectrum disorder. *Journal of Autism and Developmental Disorders, 45,* 2411-2428. doi:10.1007/s10803-015-2407-8

Schwandt, T. A. (2007). *The SAGE dictionary of qualitative inquiry* (3rd ed.). Thousand Oaks, CA: Sage.

Shire, S. Y., & Jones, N. (2014). Communication partners supporting children with complex communication needs who use AAC: A systematic review. *Communication Disorders Quarterly*. doi:10.1177/1525740114558254

*Simpson, K., Beukelman, D., & Bird, A. (1998). Survey of school speech and language service provision to students with severe communication impairments in Nebraska. *Augmentative & Alternative Communication*, *14*, 212–221. doi:10.1080/07434619812331278386

Smith, M., & Grove, N. (2003). Asymmetry in input and output for individuals who use augmentative and alternative communication. In J. Light, D. Beukelman, & J. Reichle (Eds.), *Communicative competence of individuals who use augmentative and alternative communication*. Baltimore, MD: Brookes.

Snell, M. E., Brady, N., McLean, L., Ogletree, B. T., Siegel, E., Sylvester, L., … Sevcik, R. (2010). Twenty years of communication intervention research with individuals who have severe intellectual and developmental disabilities. *American Journal on Intellectual and Developmental Disabilities*, *115*, 364–80. doi:10.1352/1944-7558-115-5.364

Snell, M. E., & Brown, F. (2011). *Instruction of students with severe disabilities* (7th ed.). Boston: Pearson.

****Snell, M. E., Chen, L.-Y., & Hoover, K. (2006). Teaching augmentative and alternative communication to students with severe disabilities: A review of intervention research 1997-2003. *Research & Practice for Persons with Severe Disabilities*, *31*, 203–214.

Soto, G., & Zangari, C. (2009). *Practically speaking: Language, literacy, & academic development for students with AAC needs.* Baltimore, MD: Brookes.

Stake, R. E. (1995). *The art of case study research.* Thousand Oaks, CA: Sage.

Stake, R. E. (2006). *Multiple case study analysis*. New York: Guilford.

Stark, E. G. (2014). *Forming Google form* [Online form]. Retrieved, with permission, from https://sites.google.com/a/newvisions.org/nvchs-sped/instruction---ict---coplanning

*Stoner, J. B., Angell, M. E., & Bailey, R. L. (2010). Implementing augmentative and alternative communication in inclusive educational settings: A case study. *Augmentative and Alternative Communication*, *26*, 122–135.

*Sutherland, D. E., Gillon, G. G., & Yoder, D. E. (2005). AAC use and service provision: A survey of New Zealand speech-language therapists. *Augmentative and Alternative Communication*, *21*, 295–307. doi:10.1080/07434610500103483

Towles-Reeves, E., Kearns, J., Flowers, C., Hart, L., Kerbel, A., Kleinert, H., . . . Thurlow, M. (2012). *Learner characteristics inventory project report (A product of the NCSC validity evaluation)*. Minneapolis, MN. Retrieved from http://ncscpartners.org/Media/Default/PDFs/Resources/LCI-Project-Report-8-21-12.pdf

Tuckman, B. W., & Jensen, M. A. C. (1977). Stages of small-group development revisited. *Group & Organization Studies*, *2*, 419–427. doi:10.1177/105960117700200404

Turnbull, A., Turnbull, H. R., Erwin, E. J., Soodak, L. C., & Shogren, K. A. (2015). *Families, professionals, and exceptionality: Positive outcomes through partnership and trust* (7th ed.). Upper Saddle River, NJ: Pearson.

US Department of Education. (2014). *Thirty-sixth annual report to Congress on the implementation of the Individuals with Disabilities Education Act, 2014*. Washington, D. C. Retrieved from http://www.ed.gov/about/reports/annual/osep/2004/index.html

***Westover, J. M. (2010). *Increasing the literacy skills of students who require AAC through modified direct instruction and specific instructional feedback* [Dissertation]. University of Oregon.

Wetherby, A. M., Reichle, J., & Pierce, P. L. (1998). The transition to symbolic communication. In A. Wetherby, S. Warren, & J. Reichle (Eds), *Communication and language intervention series, volume 7* (pp. 197-230). Baltimore, MD: Brookes.

Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analaysis is finding its heart. *Journal of Applied Behavior Analysis*, *11*, 203–214.

Yin, R. K. (2014). *Case study research: Design and methods* (5th ed.). Los Angeles, CA: Sage.

Zimmerman, I. L., Steiner, V. G., & Pond, R. E. (2012). *Preschool Language Scale* (5th ed.). San Antonio, TX: Harcourt Assessment.

---

*Addresses supports and/or barriers to providing AAC services, and collects self-report data from AAC team members using survey, interviews, or focus groups.

**Addresses interventions directed at supporting AAC team functioning and reports an examination of the effects of operationalized interventions to facilitate AAC teaming.

***Includes an adult (over age 18) observed implementing AAC instruction with an individual who used AAC.

****Targets initial AAC instruction for children with severe disabilities which identifies strategies that have been used to teach AAC to students with severe disabilities, best practices in AAC instruction identified by Calculator and Black (2009), and a review of evidence supporting AAC instructional strategies delineated by Schlosser & Sigafoos, 2006.

Appendix A

IRB Approval

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research

Office for the Protection of Research Subjects
528 East Green Street
Suite 203
Champaign, IL 61820

May 21, 2015

Hedda Meadan-Kaplansky
Special Education
288 Education Bldg
1310 S Sixth St
Champaign, IL 61820

RE: *Supplementing a School Team in Planning and Implementing AAC for a Child with Intellectual Disability*
IRB Protocol Number: 15842

Dear Dr. Meadan-Kaplansky:

Your response to stipulations for the project entitled *Supplementing a School Team in Planning and Implementing AAC for a Child with Intellectual Disability* has satisfactorily addressed the concerns of the UIUC Institutional Review Board (IRB) and you are now free to proceed with the human subjects protocol. The UIUC IRB approved, by expedited review, the protocol as described in your IRB-1 application with stipulated changes. The expiration date for this protocol, IRB number 15842, is 05/20/2016. The risk designation applied to your project is *no more than minimal risk*. Certification of approval is available upon request.

Copies of the attached date-stamped consent form(s) must be used in obtaining informed consent. If there is a need to revise or alter the consent form(s), please submit the revised form(s) for IRB review, approval, and date-stamping prior to use.

Under applicable regulations, no changes to procedures involving human subjects may be made without prior IRB review and approval. The regulations also require that you promptly notify the IRB of any problems involving human subjects, including unanticipated side effects, adverse reactions, and any injuries or complications that arise during the project.

If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me at the OPRS office, or visit our Web site at http://oprs.research.illinois.edu.

Sincerely,

Anita Balgopal, PhD
Director, Office for the Protection of Research Subjects

Attachment(s)

c: Melinda Snodgrass

Appendix B

Study Timeline

Date	Activity
Tuesday, September 8, 2015	Data collection officially began
Monday, September 14, 2015	Observation video collection began
Wednesday, September 16, 2015	Nina's Initial Interview
Friday, September 18, 2015	Clair and Lizzy's Initial Interviews
Friday, September 25, 2015	Weekly self-report logs began
Monday, September 28, 2015	**Baseline Began**; Jane's Initial Interview
Tuesday, September 29, 2015	Elsa's Initial Interview
Tuesday, October 13, 2015	**Intervention 1: Structured Team Meeting**
Thursday, October 15, 2015	Lizzy's Post-Intervention 1 Interview
Friday, October 16, 2015	Elaine's Post-Intervention 1 Interview
Monday, October 19, 2015	Jane and Elsa's Post-Intervention 1 Interviews
Wednesday, October 21, 2015	Nina's Post-Intervention 1 Interview
Tuesday, October 27, 2015	Clair's Post-Intervention 1 Interview
Thursday, November 5, 2015	**Intervention 2: Coaching began with Nina**
Wednesday, November 18, 2015	Jane began new Intervention Routine
Thursday, November 19, 2015	**Intervention 2: Coaching began with Elsa**
November 25-27, 2015	*No School – Thanksgiving Break*
Friday, December 4, 2015	**Intervention 2: Coaching began with Lizzy**
Monday, December 14, 2015	Nina's Post-Intervention 2 Interview
December 21, 2015 - January 4, 2016	*No School – Winter Break*
Friday, January 8, 2016	Booster Sessions with Lizzy and Elsa
Monday, January 11, 2016	**Intervention 2: Coaching began with Jane**; Elsa's Post-Intervention 2 Interview
Thursday, January 14, 2016	Lizzy's Post-Intervention 2 Interview
Tuesday, February 2, 2016	Booster Session with Elsa
Friday, February 5, 2016	**Maintenance conditions began**
Tuesday, February 16, 2016	Jane's Post-Intervention 2 Interview
Wednesday, February 17, 2016	Booster Session with Nina
Friday, February 26, 2016	Final day of video observations and weekly self-report logs
Friday, March 4, 2016	Nina's Final Interview
Monday, March 14, 2016	Clair's Final Interview
Tuesday, March 15, 2016	Elsa's Final Interview
Wednesday, March 16, 2016	Lizzy's Final Interview
Thursday, March 17, 2016	Jane's Final Interview

Appendix C

Additional Information for Study Features

Eli's AAC System Detailed Description

AAC symbols. Eli's AAC system used graphic Picture Communication Symbols (PCS) by Mayer-Johnson (see http://www.mayer-johnson.com/category/symbols-and-photos). These symbols were presented dynamically via the iPad PODD with Compass app in approximately 1-inch squares, using the 15-symbol display grid available in the app. The symbols remained consistent throughout the study.

AAC technique. AAC technique refers to the approach or method to message selection, display, and output on an AAC system, or how the individual uses the system (Beukelman & Mirenda, 2013). Eli used direct selection on a dynamic display to produce both visual output and digitized speech. That is, when Eli touched an icon within the app on his iPad, the iPad would produce the corresponding spoken message with a digitized voice (output) and/or change the display on the screen to provide Eli with additional icon choices (dynamic display). The AAC technique remained consistent throughout the study.

AAC equipment. I also identified the equipment needed for the AAC system, including the name and specifications of the system and any supplementary equipment (e.g., carrying case, keyguard). Nina had loaded the PODD with Compass app onto an iPad mini and purchased an iAdapter case (http://www.amdi.net/iadapter-mini) with speakers to allow others to easily hear what was said with the device, to protect the iPad as Eli carried it around, and to help Eli distinguish it from other iPads (see Figure 5 in the narrative)[118]. She had also purchased a clear plastic keyguard that snapped into the case to facilitate Eli's fine motor use of the touchscreen. In addition, Nina purchased a harness from Safe and Sound Mobile

[118] Nina's Initial Interview, p. 3.

(http://www.safensoundmobile.com/about) for Eli to wear to which the iAdapter case could be clipped, allowing Eli to carry his AAC system with him hands-free (see Figure 5 in the narrative). Nina replaced the iAdapter case during the study after a failed repair and the keyguard after the original broke, but the equipment remained consistent across the study[119].

AAC vocabulary. The vocabulary available on Eli's AAC system was mostly from the preprogrammed set available in the Compass app. Nina customized some aspects of the vocabulary set to reflect Eli's needs. For example, she and the SLP, Clair, added photos and names of people in Eli's family, school, and community networks under the "people" category, and Nina deleted references to pork in the "foods" category, as the family is Jewish and does not consume pork products. However, she took great care not to change the vocabulary too much, stating, "Our goal was to teach symbols and teach motor memory, so actually I personally try not to make a lot of changes. I want the device to be as consistent as possible.[120]"

Rationale for Video Frequency

I chose to ask participants to video record two routines daily for five reasons. First and foremost, in my experience, recording an activity every time it occurs minimizes the impact of the research on participants' lives and settings (Brantlinger et al., 2005). After the initial adjustment, recording the activity becomes part of the routine and reduces the cognitive load of remembering to record the activity on an intermittent schedule. This leads to my second reason for this intensive frequency. When the recording becomes integrated into the routine of the activity, this minimizes testing threats to internal validity of the data (Kratochwill et al., 2010). Because these videos will also be used in the single-case design, this is very desirable. Third, the dependent variables in the single-case study are behaviors that can be freely emitted by the

[119] Nina's Final Interview, p. 2.
[120] Nina's Final Interview, p. 2.

participants rather than being dependent on a clear discriminative stimulus (i.e., dependent variables are being observed under free operant conditions; Gast & Ledford, 2014). When this is true, continuous data collection facilitates the identification of a functional relation between the independent and dependent variables (Gast & Ledford, 2014), adding additional cause for daily video recording for this study. Fourth, intermittent observation increases instrumentation threats to internal validity, as it increases the likelihood of reactivity (i.e., increase in scores as a result of the observational process; Kratochwill et al., 2010). Finally, because of the single-case design selected as part of this study and the criteria for high quality single-case research (e.g., at least five data points in each study condition; see subsequent section), intermittent observation would lengthen the duration of this study considerably, extending the impact of the research on participants' lives and settings (Brantlinger et al., 2005), increasing the cost of this study beyond available funding, and possibly precluding the completion of the study before the end of the child's school year. Taken together, I believe that this schedule of observations maximized the likelihood that I would have sufficient data to warrant the analyses and implications made from these data across methodologies in this study.

However, I also recognized two possible limitations to the quantity of video data I propose here. First, video recording may not have been feasible or placed undue burden on the research participants. Second, I did not have the capacity to analyze all of the video data collected. Next, I identify supports for this video frequency as it relates to these two limitations and summarize the videos collected.

To address the potential limitations to the frequency of video recording proposed here, I combined observation for case study and single-case design purposes, randomly selected 5-minute segments from each video submitted to observe, and hired a graduate assistant to conduct

2/5 of these observations. To alleviate participant concerns about video recording their routines, I came and video recorded the activity for them until they became comfortable with the recording procedures. This required no more than two sessions for any of the participants.

In all, the participants reported that video recording was not problematic. Nina said, "It was fine. Again, I just added it to my routine.[121]" Similarly, Jane noted, "I didn't mind, I mean, I liked it. I didn't mind doing it [videotaping].[122]" Elsa said, "I just turned it on and did it and never looked at it. . . . That could have been irrelevant to me, to be honest.[123]" Clair said,

> It almost just became like, "This is just what I do." It just became part of the routine so it wasn't very invasive. The only thing that made it difficult was when it wasn't in Elsa's room. If it was in a different location, setting it up could be tricky and I felt like it could never get good audio when we were out in the hall.[124]

Lizzy commented that videotaping in the general education setting was more difficult because she had to prevent capturing other children in the footage. She said, "Yeah, it was a pain [in art; her generalization routine]. It was no big deal at all in PRT [pivotal response training; her intervention routine].[125]"

Single-case Data for Rate of Strategy Use to Individual Scale

Because Nina used the instructional strategies at higher rates than the other team members, the graphs in the main narrative use scales that accommodate her rate. Here, I present four individual graphs for each participant, each using a scale suited for the maximum rate of the individual. These graphs allow more careful examination of patterns of behavior for each Facilitator. As before, blue areas are aided AAC modeling, red lines are creating opportunities, and green bars are systematic prompting use. Vertical dashed lines denote study conditions.

[121] Nina's Final Interview, p. 9.
[122] Jane's Final Interview, p. 11.
[123] Elsa's Final Interview, p. 5.
[124] Clair's Final Interview, p. 4.
[125] Lizzy's Final Interview, p. 8.

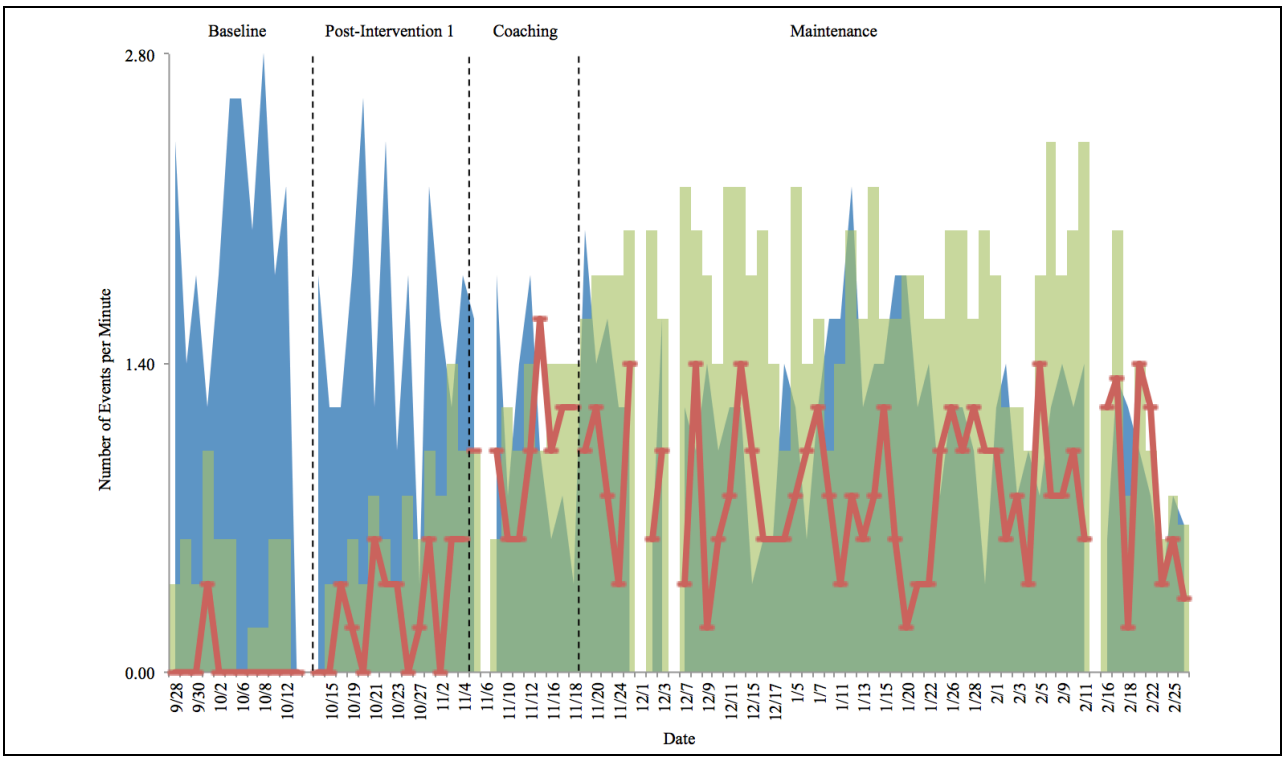


Figure 10. Nina's rate of strategy use during Intervention Routines across conditions. Blue areas are aided AAC modeling, red lines are creating opportunities, green bars are systematic prompting use (any fidelity score).

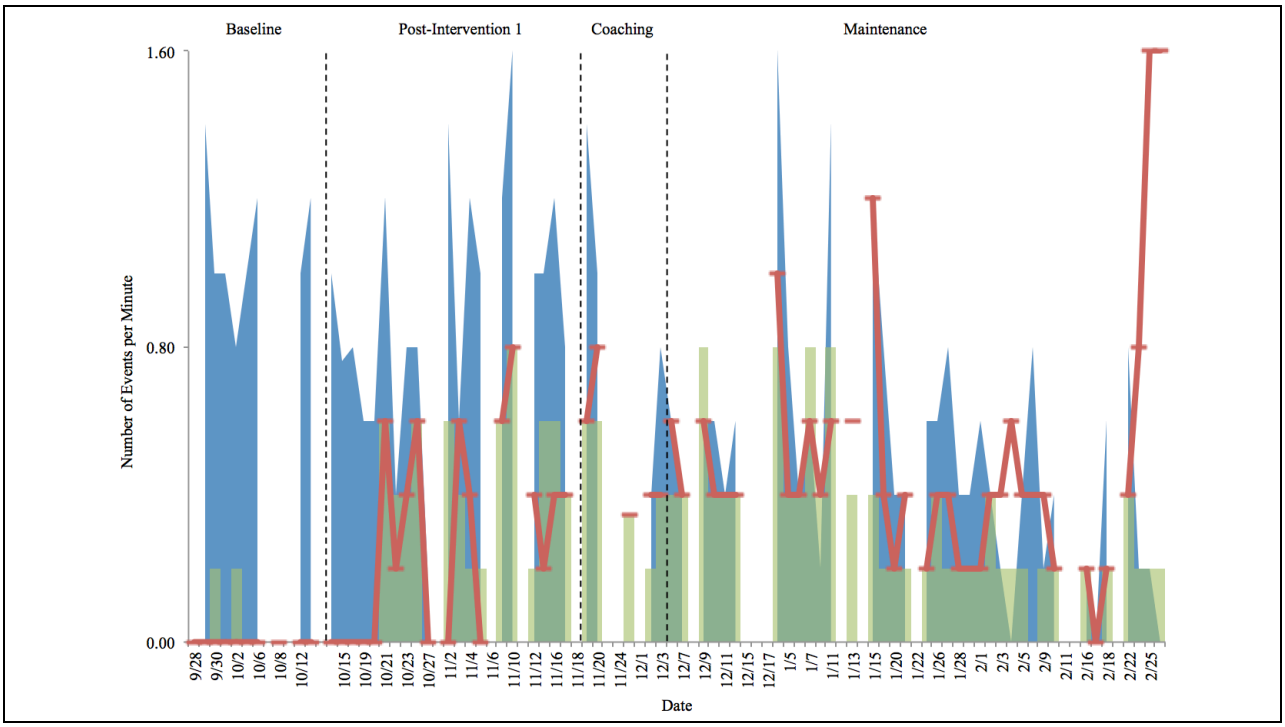


Figure 11. Elsa's rate of strategy use during Intervention Routines across conditions. Blue areas are aided AAC modeling, red lines are creating opportunities, green bars are systematic prompting use (any fidelity score).

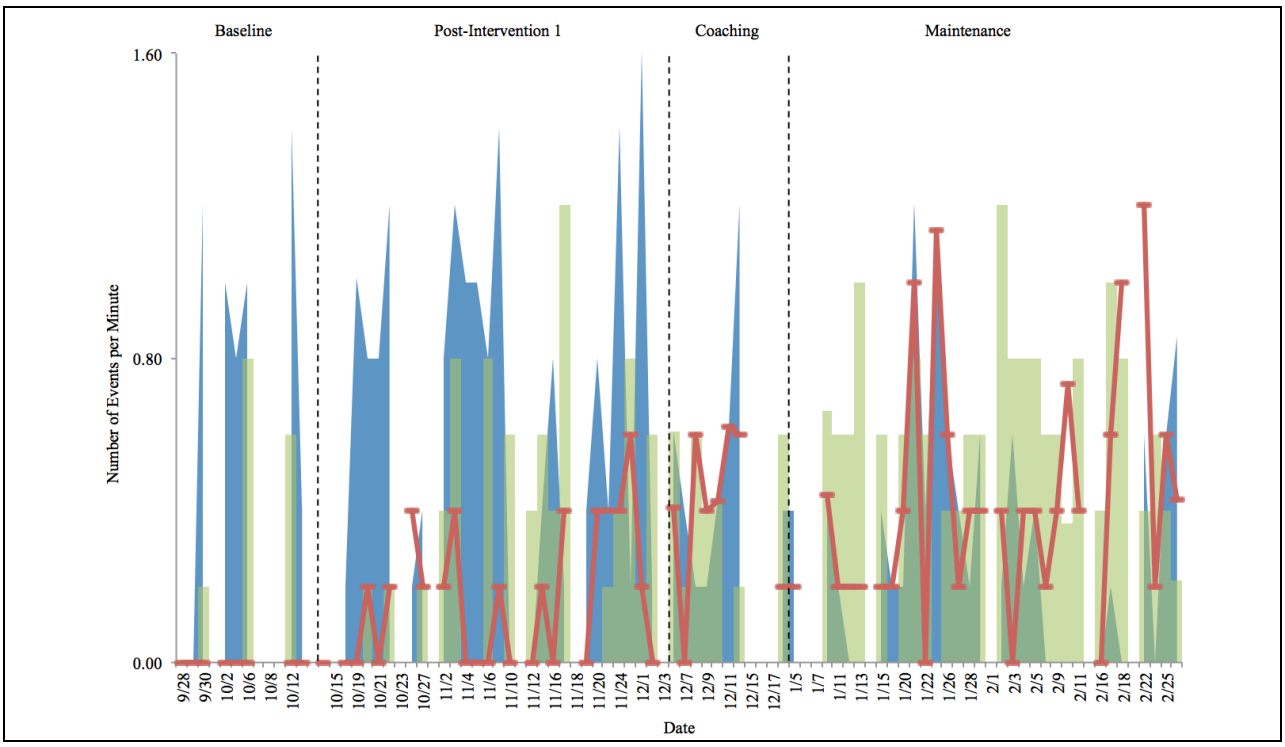


Figure 12. Lizzy's rate of strategy use during Intervention Routines across conditions. Blue areas are aided AAC modeling, red lines are creating opportunities, green bars are systematic prompting use (any fidelity score).

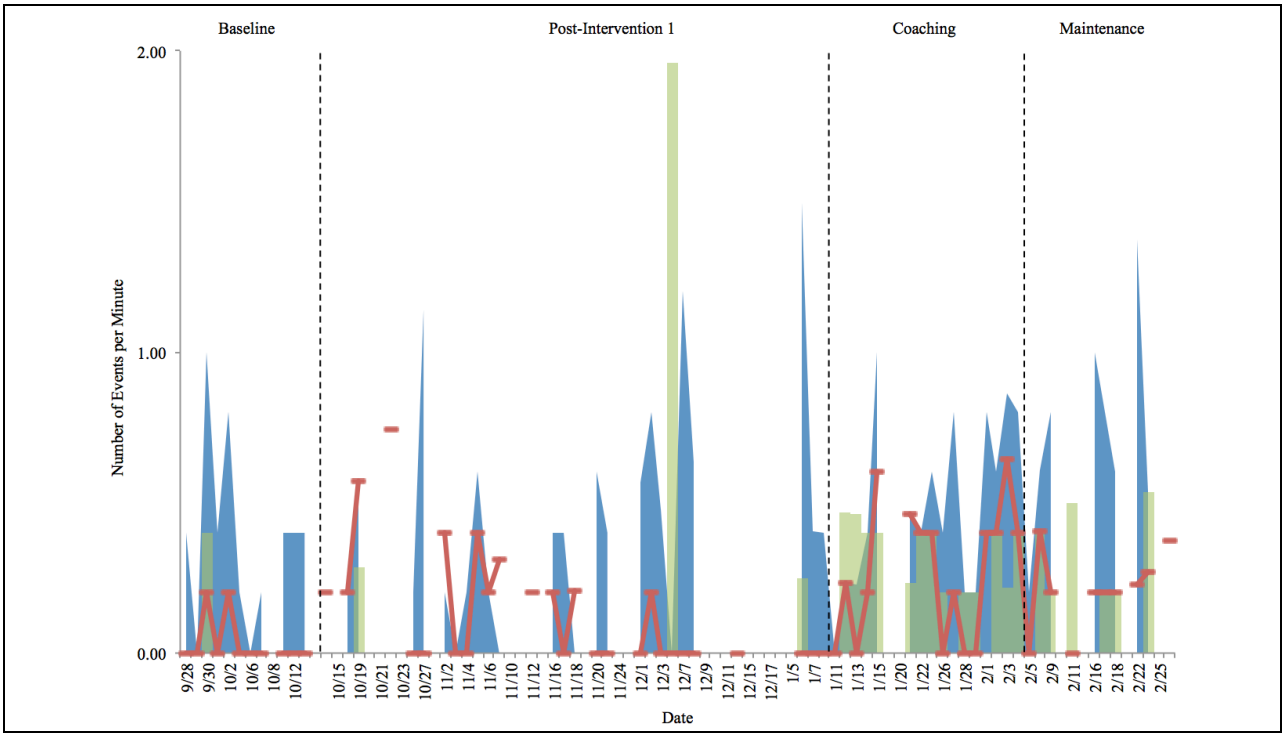


Figure 13. Jane's rate of strategy use during Intervention Routines across conditions. Blue areas are aided AAC modeling, red lines are creating opportunities, green bars are systematic prompting use (any fidelity score).

Single-case Data for Generalization Routines

Figure 14 represents the single-case data for the primary dependent variable, percentage of high-fidelity use of systematic prompting, with both Intervention Routines (IR) and Generalization Routines (GR) across Facilitators. Each tier represents the performance data of one Facilitator. The data points represent the percent of most-to-least systematic prompting use in which the Facilitator received a fidelity score of 4 (i.e., perfect fidelity) in the session. Squares represent IRs and circles represent GRs. Sessions marked with an "x" or open circle are sessions during which the Facilitator never used prompting. Those marked with an open square are sessions in which the Facilitator received coaching (Intervention 2). The data are identical to those presented in Figure 6 in the narrative with data for GRs added.

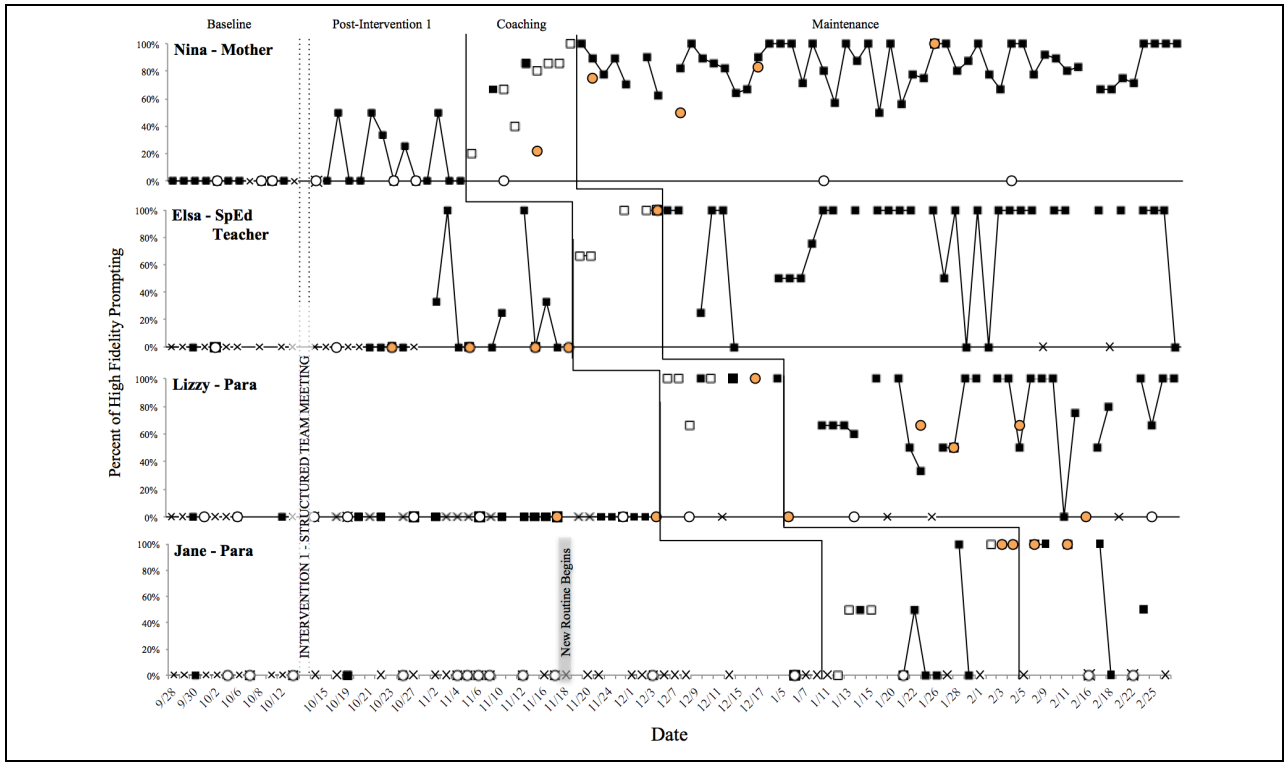


Figure 14. Single-case design graph of the primary dependent variable in Intervention and Generalization Routines. Line graphs are each participant's percentage of high-fidelity (score = 4/4) use of most-to-least prompting. Squares are Intervention Routine, circles are Generalization Routine. Xs and open circles are sessions during which participant never used prompting; open squares are days when the participant received coaching (Intervention 2).

Figure 15 represents the single-case data for the secondary variables, rate of strategy use, in Generalization Routines for all four Facilitators. The blue bars represent aided AAC modeling, the red lines represent creating opportunities, and the green bars represent most-to-least systematic prompting (any fidelity score). Of note, Nina's rate of strategy use is represented on a different scale because she used aided AAC modeling at rates more than double that of the other participants. Variation in scales was necessary to observe changes in rates for Elsa, Lizzy, and Jane.

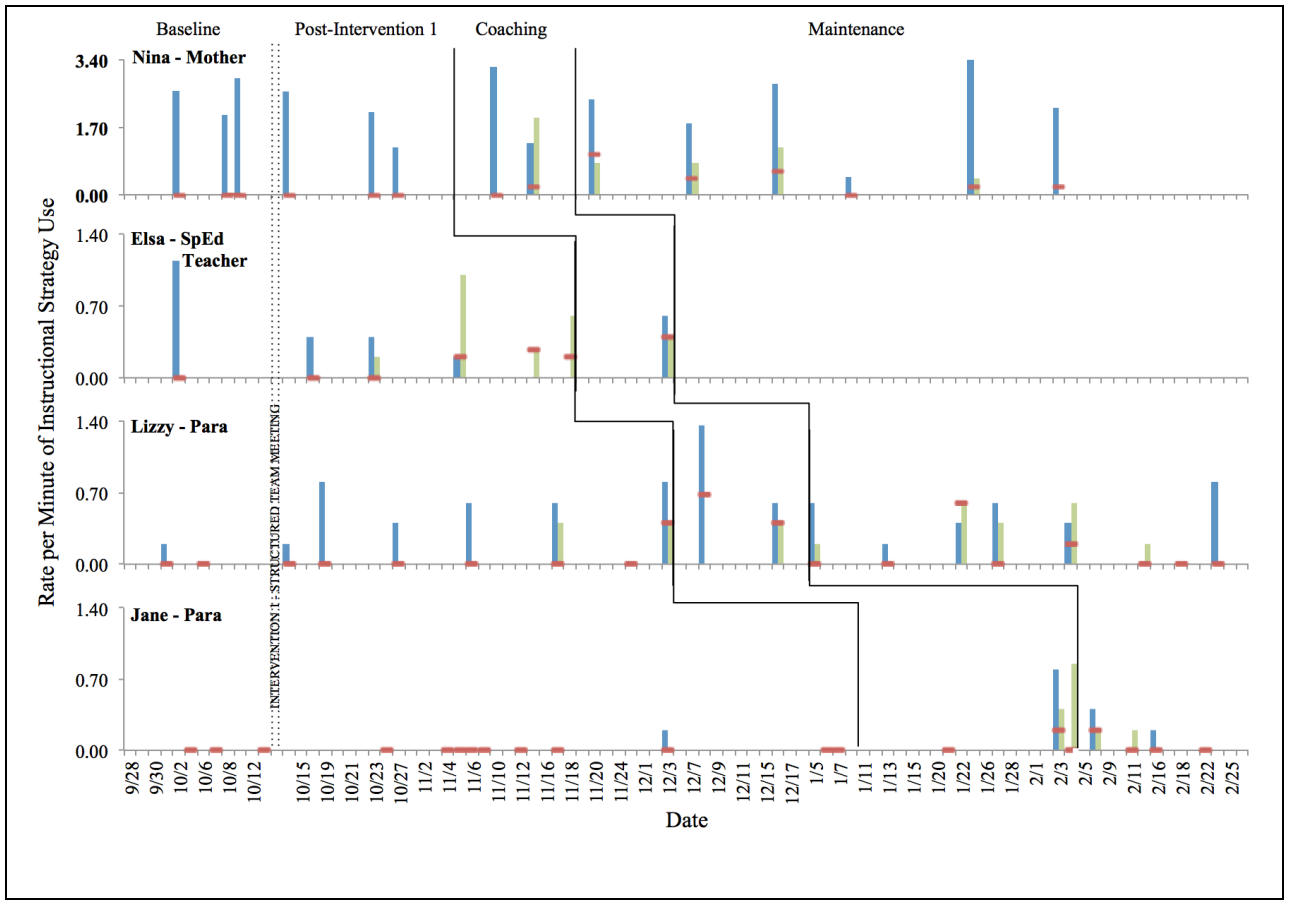


Figure 15. Rate of strategy use during Generalization Routines across Facilitators and conditions. Blue bars are aided AAC modeling, red lines are creating opportunities, green bars are systematic prompting use (any fidelity score). Nina's data are plotted on a different scale than the other three Facilitators.

Appendix D

Demographic Forms

FORM 1: Family Demographic Form

Getting to Know You

Thank you for taking time to complete this survey to help us get to know a bit about you, your child, and your family before we begin the research study. All responses are optional and we think it will take about 10 minutes to complete this form. Thank you!

About Your Child

Please tell us about your child who uses AAC.

Name of focus child with disability:

Sex: ☐ Female ☐ Male

Date of birth:

Disability:

Age of diagnosis:

Please check all support services your focus child with a disability currently receives in school:

☐ Speech therapy ☐ Occupational therapy ☐ Hearing/Audiology

☐ Vision ☐ Physical therapy ☐ Nursing/School Health

☐ Other (please specify):

If your child receives services **outside of school**, please tell us about those services and about how many hours per week s/he receives.

About Your Family

Please tell us about your child's parent(s)/guardian(s).

Parent/guardian 1:

Name:

Sex:

Occupation:

Age (check one):
☐ Younger than 25
☐ 25-35
☐ 36-45
☐ 46-55
☐ Older than 55

Marital status (check one):
☐ Single
☐ Married
☐ Divorced
☐ Widowed

Race/ethnicity (check one):
☐ American Indian and Alaskan Native
☐ Asian
☐ Black or African American
☐ Hispanic or Latino

Highest educational level or degree (check one):
☐ High school or GED
☐ Associate's degree
☐ Bachelor's degree
☐ Master's degree

☐ Native Hawaiian or Other Pacific Islander
☐ White
☐ Two or more races

☐ Doctorate degree
☐ Other

Parent/guardian 2:

Name:
Occupation:

Sex:

Age (check one):
☐ Younger than 25
☐ 25-35
☐ 36-45
☐ 46-55
☐ Older than 55

Marital status (check one):
☐ Single
☐ Married
☐ Divorced
☐ Widowed

Race/ethnicity (check one):
☐ American Indian and Alaskan Native
☐ Asian
☐ Black or African American
☐ Hispanic or Latino
☐ Native Hawaiian or Other Pacific Islander
☐ White
☐ Two or more races

Highest educational level or degree (check one):
☐ High school or GED
☐ Associate's degree
☐ Bachelor's degree
☐ Master's degree
☐ Doctorate degree
☐ Other

Please use the following categories to provide an approximate estimate of your family's annual income:
☐ Less than $10,000
☐ Between $10,000 and $25,000
☐ Between $25,000 and $45,000
☐ Between $45,000 and $65,000
☐ Between $65,000 and $85,000
☐ Between $85,000 and $100,000
☐ Greater than $100,000

Please tell us about your other children.

Child 1:
Name:

Sex: ☐ Female ☐ Male

Date of birth:

Disability: ☐ Yes:
☐ No

Child 2:
Name:

Sex: ☐ Female ☐ Male

Date of birth:

Disability: ☐ Yes:
☐ No

Child 3:
Name:

Sex: ☐ Female ☐ Male

Date of birth:

Disability: ☐ Yes:
☐ No

If you have additional children, please tell us about them here:

FORM 2: Non-family Demographic Form

Getting to Know You

Thank you for taking time to complete this survey to help us get to know a bit about you and your relationship with *child* before we begin the research study. All responses are optional and we think it will take about 10 minutes to complete this form. Thank you!

Please tell us about yourself.

Name:

Sex:

Age (check one):
- ☐ Younger than 25
- ☐ 25-35
- ☐ 36-45
- ☐ 46-55
- ☐ Older than 55

Marital status (check one):
- ☐ Single
- ☐ Married
- ☐ Divorced
- ☐ Widowed

Race/ethnicity (check one):
- ☐ American Indian and Alaskan Native
- ☐ Asian
- ☐ Black or African American
- ☐ Hispanic or Latino
- ☐ Native Hawaiian or Other Pacific Islander
- ☐ White
- ☐ Two or more races

Highest educational level or degree (check one):
- ☐ High school or GED
- ☐ Associate's degree
- ☐ Bachelor's degree
- ☐ Master's degree
- ☐ Doctorate degree
- ☐ Other

Role on child's AAC team:
- ☐ Special education teacher
- ☐ Speech therapist
- ☐ Occupational therapist
- ☐ Physical therapist
- ☐ Paraprofessional
- ☐ Other (please specify):

How long have you been in your current role?

How long have you known the child?

How many total years of experience do you have in this role?

Have you worked with other individuals with intellectual disability and complex communication needs who use AAC?
- ☐ Yes
- ☐ No

Appendix E

Interview Protocols

Initial Interview Protocol – Non-Family Team Members

1. INTRODUCTION AND REVIEW OF INFORMED CONSENT

This is an interview associated with the study you are participating in about *child*'s augmentative and alternative communication (AAC). The interview should last about one hour and will cover three main topics related to the child's AAC and your role. We will be taking written notes on our computer; we will not include any identifying information in these notes, but will refer to you as Respondent A (etc.). We will also audio record this the interview, and we will store the recording on a secure University of Illinois server and will not be shared with anyone other than the members of this research team.

We do not anticipate any risk to participating in this interview greater than normal life and we anticipate that the results of this interview will help us better understand your experiences with *child*'s AAC. We will use your responses to contribute to our description of *child*'s AAC experience and to develop tools for other parts of this study. We will include the results of the interview in presentations and publications about this study but we will take great effort to ensure all references to your responses will not identify you.

2. Your participation in this interview is completely voluntary, and you are free to withdraw at any time and for any reason without penalty. You are also free to refuse to answer any questions you do not wish to answer.

Do you have any questions? [Answer any questions.]

Thank you so much! Let's begin.

[Interviewer begins audio recording.]

3. *Interviewer:* To begin, we'd like to ask a few questions about your experience with *child* and your experiences in your current role.

4. DEMOGRAPHIC QUESTIONS:

- How long have you been a [special education teacher] [speech pathologist] [etc.]?
- How many total years of experience (in this and other positions) do you have with individuals who use AAC?
- Do you have any other experience with AAC outside of your professional experiences, such as with a family member or friend?
- For how long have you known *child*?
- Please tell about your interactions with *child* on a typical day at [*school*] [*other setting*] and the services s/he receives from you.

AAC SYSTEM QUESTIONS (AAC System Description; Knowledge about system)**:**

Interviewer: We'd like to start by talking about how *child* communicates with you.

- Please describe how *child* communicates with you.
    - Probes:
      How do you know when *child* wants something?
      What does *child* do to tell you when s/he doesn't want something?
      Can you tell when the child is interested in something or notices something around him/her? How?
      What does s/he do to communicate that to you?

- Please tell me as much as you know about *child*'s AAC systems. What things are in place to allow *child* to communicate with you and with others?
    - Probes:
      Do you know the name of the device s/he has?
      Are there materials or tools that *child* uses to communicate with you or others?
      Does *child* need any equipment to use those materials?

- Can you describe what an interaction between you and *child* looks like on a typical day?

- How about on his/her **best** days? What do your interactions look like then?

- And when s/he's having a **bad** day?

SUPPORTS QUESTIONS (AAC Supports)**:**

Interviewer: We would like to learn about things that help and support you when you're supporting *child*'s AAC.
- Are there things or people you have found helpful and supportive when working with *child*'s AAC?
    - If so, please describe.
    - What made it/them helpful?
- Are there supports your school provides for planning for and implementing AAC with child?
        - Probe: Does the school provide time to meet as a team, money for equipment or training, and/or other resources?
    - If so, what do those supports look like?
    - How helpful have these supports been?
- What things help you work with the rest of *child*'s team?
- What role has *child*'s family played in supporting AAC?
- Have you received training in AAC?
    - If so, what training do you have?
    - How helpful has that training been?

BARRIERS QUESTIONS (AAC Supports)**:**
Interviewer: We would also like to learn about what things make supporting *child's* AAC difficult.
- What have you found difficult when working with *child*'s AAC?
- Are there things that your school does that make providing AAC services difficult?
    - If so, what are these things?
    - Why are they problematic?
- Are there things that other members of the child's team do that makes providing AAC services difficult?
    - If so, what are these things?
    - Why are they problematic?
- Are there things that the child's family does that make providing AAC services difficult?
    - If so, what are these things?
    - Why are they problematic?
- What about your own knowledge and experience? Are there aspects of your own experience that make providing AAC services difficult?
    - If so, what are these things?
    - Why are they problematic?
- Are there any other things standing in the way of feeling successful with *child*'s AAC?

CHILD'S AAC PLAN (Knowledge about plan; Agreement with plan; Investment in plan)**:**

Interviewer: Now I'd like you to think about what you know about the plan for teaching *child* to use his/her AAC system(s) and other communication skills.

- Please tell me as much as you can about how *child*'s team plans to teach him/her to use AAC and other communication skills.
  - Probes:
    Is someone in charge of managing the equipment (e.g., programming, charging, replacing lost symbols, etc.)?
    Are there strategies the team plans to use or is already using to teach these skills?
- Tell me your thoughts about this plan. Are there things you like about it? Are there things you disagree with? Do you have a different plan?
  - Probes:
    What are the strengths of this plan?
    What are the weaknesses of this plan?
    If you could change the plan, what would you change and why?
- In your opinion, what long-term communication goals are you and the team working toward with this plan?
  - Probes:
    What do you hope *child*'s communication will look like a year from now? How about 3 years from now? 10 years?
    In what ways do you think the current plan is contributing to meeting these goals?
- Tell me about your role in this plan. What do feel responsible for? How much time do you spend working on the different aspects of the plan? How invested are you in putting this plan in place?

EXPERIENCE ON THE TEAM (Experiences as team member)

Interviewer: I'd like you to think about your experiences on *child's* educational team.

- Please tell me about your experiences as member of *child's* educational team.
  - Probes:
    How often do you meet with other members of the team?
    Do you feel like you have a role in decision-making on the team? What is that role?
    What experiences have you had with this team that have made you feel good? Not so good?
- How would you define a "good" or "successful" educational teaming experience for you?
  - Probes:
    When you feel good about your part on an educational team, what does that teaming experience look like?
    Even when you don't feel great about how things are going for a child, are there ways that you still can feel good about your team's functioning? If so, what are those ways?

CLOSING

Interviewer: Thank you so much for sharing your experiences. Before we end,

- Is there anything else about supporting *child*'s AAC that you'd like to share?
- Do you have any concerns about the activities of this study that you'd like to discuss?
- Are you comfortable moving forward into the next phase of the study [explain activities of the next phase]?

Interviewer: Thank you so much for taking the time to talk to us!

Initial Interview Protocol – Family Team Members

1. INTRODUCTION AND INFORMED CONSENT

This is an interview associated with the study you are participating in about *child*'s augmentative and alternative communication (AAC). The interview should last about one hour and will cover three main topics related to your child's AAC and your role. We will be taking written notes on our computer; we will not include any identifying information in these notes, but will refer to you as Respondent A (etc.). We will also audio record this the interview, and we will store the recording on a secure University of Illinois server and will not be shared with anyone other than the members of this research team without your permission.

We do not anticipate any risk to participating in this interview greater than normal life and we anticipate that the results of this interview will help us better understand your experiences with *child*'s AAC. We will use your responses to contribute to our description of *child*'s AAC experience and to develop tools for other parts of this study. We will include the results of the interview in presentations and publications about this study but we will take great effort to ensure all references to your responses will not identify you.

2. Your participation in this interview is completely voluntary, and you are free to withdraw at any time and for any reason without penalty. You are also free to refuse to answer any questions you do not wish to answer.

Do you have any questions? [Answer any questions.]

Thank you so much! Let's begin.

[Interviewer begins audio recording.]

3. *Interviewer:* To begin, we'd like to ask a few questions about your experience with *child*.

4. DEMOGRAPHIC QUESTIONS:

- How old is your child?
- Tell us about your experiences in learning that your child had a disability.
    - Probes:
      How old was your child when s/he was diagnosed?
      When did you first wonder if your child would talk?
      What made you start your investigation into AAC?
- Do you have any other experience with AAC?

AAC SYSTEM QUESTIONS (AAC System Description; Knowledge about system)**:**

Interviewer: We'd like to start by talking about how *child* communicates with you.

- Please describe how *child* communicates with you.
    - Probes:
      How do you know when *child* wants something?
      What does *child* do to tell you when s/he doesn't want something?
      Can you tell when the child is interested in something or notices something around him/her? How?
      What does s/he do to communicate that to you?

- Please tell me as much as you know about *child*'s AAC systems. What things are in place to allow *child* to communicate with you and with others?
    - Probes:
      Do you know the name of the device s/he has?

Are there materials or tools that *child* uses to communicate with you or others?
Does *child* need any equipment to use those materials?

- Can you describe what an interaction between you and *child* looks like on a typical day?

- How about on his/her **best** days? What do your interactions look like then?

- And when s/he's having a **bad** day?

SUPPORTS QUESTIONS (AAC Supports)**:**

Interviewer: We would like to learn about things that help and support you when you're supporting *child*'s AAC.
- What and whom have you found helpful and supportive when working with *child*'s AAC?
- Do you have the supports you need to be able to meet with the school/therapy team, pay for equipment or training, and/or other resources to support planning for and implementing AAC with *child*?
  - If so, what do those supports look like?
  - How helpful have these supports been?
- Do you have supports outside of the school that help you support *child*'s AAC?
  - If so, what do those supports look like?
  - How helpful have these supports been?
- Have you received training in AAC?
  - If so, what training do you have?
  - How helpful has that training been?

BARRIERS QUESTIONS (AAC Supports)**:**
Interviewer: We would also like to learn about what things make supporting *child's* AAC difficult.
- What have you found difficult when working with *child*'s AAC?
- Are there things that your school does that make providing AAC services difficult?
  - If so, what are these things?
  - Why are they problematic?
- Are there things that your family does that make your child's experience with AAC difficult?
  - If so, what are these things?
  - Why are they problematic?
- What about your own knowledge and experience? Are there aspects of your own experience that makes supporting AAC difficult?
  - If so, what are these things?
  - Why are they problematic?
- Are there any other things standing in the way of feeling successful with *child*'s AAC?

CHILD'S AAC PLAN (Knowledge about plan; Agreement with plan; Investment in plan)**:**

Interviewer: Now I'd like you to think about what you know about the plan for teaching *child* to use his/her AAC system(s) and other communication skills.

- Please tell me as much as you can about how *child*'s team plans to teach him/her to use AAC and other communication skills.
  - Probes:
    Is someone in charge of managing the equipment (e.g., programming, charging, replacing lost symbols, etc.)?
    Are there strategies the team plans to use or is already using to teach these skills?
- Tell me your thoughts about this plan. Are there things you like about it? Are there things you disagree with? Do you have a different plan?
  - Probes:
    What are the strengths of this plan?

What are the weaknesses of this plan?
If you could change the plan, what would you change and why?

- In your opinion, what long-term communication goals are you and the team working toward with this plan?
  - Probes:
    What do you hope *child*'s communication will look like a year from now? How about 3 years from now? 10 years?
    In what ways do you think the current plan is contributing to meeting these goals?
- Tell me about your role in this plan. What do feel responsible for? How much time do you spend working on the different aspects of the plan? How invested are you in putting this plan in place?
- Tell me about your partnership with the school in developing and implementing this plan. What has it been like to work with the school team?

EXPERIENCE ON THE TEAM (Experiences as team member)

Interviewer: I'd like you to think about your experiences on *child's* educational team.

- Please tell me about your experiences as member of *child's* educational team.
  - Probes:
    How often do you meet with other members of the team?
    Do you feel like you have a role in decision-making on the team? What is that role?
    What experiences have you had with this team that have made you feel good? Not so good?
- How would you define a "good" or "successful" educational teaming experience for you?
  - Probes:
    When you feel good about your part on your child's educational team, what does that teaming experience look like?
    Even when you don't feel great about how things are going for your child, are there ways that you still can feel good about your team's functioning? If so, what are those ways?

CLOSING

Interviewer: Thank you so much for sharing your experiences. Before we end,

- Is there anything else about supporting *child*'s AAC that you'd like to share?
- Do you have any concerns about the activities of this study that you'd like to discuss?
- Are you comfortable moving forward into the next phase of the study [explain activities of the next phase]?

Interviewer: Thank you so much for taking the time to talk to us!

Post-Intervention 1 (Team Meeting) Interview Protocol

1. INTRODUCTION AND INFORMED CONSENT

This is a short interview for the study you are participating in about *child*'s augmentative and alternative communication (AAC). The interview should last about 30 minutes and will cover the Team Forming Meeting you participated in on *date*. I will be taking written notes and audio recording this the interview.

Remember, your participation in this interview is completely voluntary, and you are free to withdraw at any time and for any reason without penalty. You are also free to refuse to answer any questions you do not wish to answer.

Do you have any questions? [Answer any questions.]

Thank you so much! Let's begin. [Interviewer begins audio recording.]

2. TEAM FORMING MEETING

- Please tell me about your impressions of the team forming meeting.
  - GOALS: The goal was to help your team get on or stay on the same page about *child*'s AAC and work together well.
    - Do you think the meeting achieved that goal?
    - Do you think that's an important goal to have?
  - PROCEDURES: The meeting was guided by an agenda and it lasted a full 2 hours.
    - Were those procedures appropriate and worthwhile?
    - Is there anything you would change, skip, or do differently?
    - Is there anything you liked and would keep if you had to do it again? (Offer agenda for reference)
  - OUTCOMES:
    - Please tell me how you think that meeting affected the team as a whole and you as a member of the team.
    - Do you think those effects are worth the effort the meeting required?

3. EFFECTIVENESS

- Please tell me about your impressions of how well *child's* team is functioning.
  - Think about the amount of communication, clarity about roles and responsibilities, general satisfaction with your job as a member of the team.
- At this point in the school year and after the team meeting, how do you feel about your own work with *child*?
- How do you feel about *child's* communication with AAC?
  - Has it changed since the beginning of the school year?
  - Did the meeting shift anything that is affecting him?

Interviewer: Thank you so much for taking the time to talk to us! [End audio recording]

Post-Intervention 2 (Coaching) Interview Protocol

1. INTRODUCTION AND INFORMED CONSENT

This is a short interview for the study you are participating in about *child*'s augmentative and alternative communication (AAC). The interview should last about 30 minutes and will cover the coaching you received. I will be taking written notes and audio recording this the interview.

Remember, your participation in this interview is completely voluntary, and you are free to withdraw at any time and for any reason without penalty. You are also free to refuse to answer any questions you do not wish to answer.

Do you have any questions? [Answer any questions.]

Thank you so much! Let's begin. [Interviewer begins audio recording.]

2. COACHING

- Please tell me about your impressions of the coaching process.
  - GOALS: The goal was to help you learn to use three strategies (aided AAC modeling, creating opportunities, and most-to-least prompting) with *child* in a way that is most likely to help him learn to use his device (i.e., evidence-based practice).
    - Do you think the coaching achieved that goal?
    - Do you think that's an important goal to have?
  - PROCEDURES: The coaching was designed to include joint planning, observation, reflection, and feedback between you and me (the coach) during one of your routines with *child*.
    - Were those procedures appropriate and worthwhile?
      - Video feedback
      - Seeing graphs of performance
      - Coach modeling with *child*
    - Is there anything you would change, skip, or do differently?
    - Is there anything you liked and would keep if you had to do it again?
  - OUTCOMES:
    - Please tell me how you think that coaching affected your interactions with *child*.
    - Please tell me how you think coaching affected your interactions with other members of the team.
    - Do you think those effects are worth the effort coaching required from you?

3. **EFFECTIVENESS**

- Please tell me about your impressions of how well *child's* team is functioning.
  - Think about the amount of communication, clarity about roles and responsibilities, general satisfaction with your job as a member of the team.
- At this point in the school year and now that you've participating in both the team meeting and one-on-one coaching, how do you feel about your own work with *child*?
- How do you feel about *child's* communication with AAC?
  - Has it changed since the team meeting we had in October?
  - Did coaching shift anything that is affecting him?

Interviewer: Thank you so much for taking the time to talk to us! [End audio recording]

Final Interview Protocol

1. INTRODUCTION AND INFORMED CONSENT

This is an interview associated with the study you are participating in about *Eli*'s augmentative and alternative communication (AAC). The interview should last about 1.5 hours. I will be taking written notes or on my computer; I will not include any identifying information in these notes. I will also audio record this the interview and will store the recording on a secure University of Illinois server. It will not be shared with anyone other than the members of this research team without your permission.

We do not anticipate any risk to participating in this interview greater than normal life and we anticipate that the results of this interview will help us better understand your experiences with *Eli*'s AAC and the activities of this study. Your participation in this interview is completely voluntary, and you are free to withdraw at any time and for any reason without penalty. You are also free to refuse to answer any questions you do not wish to answer.

Do you have any questions? [Answer any questions.]
Thank you so much! Let's begin. [Interviewer begins audio recording.]

2. *Interviewer:* To begin, we'd like to ask a few questions about your experience with *Eli*.

AAC SYSTEM QUESTIONS (AAC System Description; Knowledge about system)**:**

Interviewer: We'd like to start by talking about how *Eli* communicates with you.

- Please describe how *Eli* communicates with you.
  - Probes:
    How do you know when *Eli* wants something?
    What does *Eli* do to tell you when he doesn't want something?

- Can you describe what a communication exchange between you and *Eli* looks like on a typical average day?

- How about on his **best** days? What do your interactions look like then?

- And when he's having a **bad** day?

- Please tell me as much as you know about how *Eli*'s AAC system has changed since the beginning of the study.
  - Probes:
    Have words been added to the system? By whom?
    Has the organization of vocabulary changed? Who changed it?
    Has any equipment changed? Why?

SUPPORTS PACKAGE

Please think about the two supports you received from this study: (1) the team meeting held at your house, and (2) one-on-one coaching from Melinda. For these questions, try to ignore the other things you had to do for the study, like videotaping and completed the online weekly log and just think about what happened in that meeting and during coaching sessions.

1. Tell me about your overall impressions of the supports package.
   a. GOALS: The goal was to help you and the team function better to help Eli with his AAC and to help each of you learn to use three evidence-based teaching strategies (aided AAC modeling, creating opportunities, and most-to-least prompting) with Eli in a way that is most likely to help him learn to use his device.
      i. Do you think the supports package achieved that goal?
      ii. Do you think that's an important goal to have?

iii. Are there other goals you wish the team had addressed instead of or in addition to these goals?

b. PROCEDURES: Think about the scripted agenda we used in the team meeting and the before- and after-meetings we had during coaching sessions. Also, think about the order in which those two things happened. (Remember, don't think about the videos, online forms, or interviews. Just think about the meeting and the coaching sessions.)

i. Were those procedures appropriate and worthwhile?

1. Did you like the sequence?

2. Were there things you would add, omit, or alter?

ii. Why do you feel that way?

c. OUTCOMES:

i. Did the supports package affect your interactions with Eli? If so, how and why do you think this happened?

ii. Did the supports package affect your interactions with other members of the team? If so, how and why do you think this happened?

iii. Do you think those effects are worth the effort required to participate in the supports package (not the research – video, online forms, etc.; just the team meeting and the coaching sessions)?

Now think about the other things you had to do as part of this research study, such as videotaping your interactions with Eli, completing the weekly online form, and doing these interviews.

2. Do you think these activities impacted your experience with AAC during this time? If so, how?
   a. What effect do you think this had on your experience on this team?
   b. What effect do you think this had on your interactions with Eli?
   c. What effect do you think this had on Eli's communication?

SUPPORTS QUESTIONS (AAC Supports)**:**

Interviewer: We would like to learn about things that help and support you when you're supporting *Eli*'s AAC.

- What and whom have you found helpful and supportive when working with *Eli*'s AAC?
- What and whom have you found helpful and supportive when working with the school team/family to plan for and implement AAC with *Eli*?
- Do you have supports outside of the school, family, and/or this project that help you support *Eli*'s AAC?
  - If so, what do those supports look like?
  - How helpful have these supports been?
- Have you received other training or support in AAC during this study that wasn't a part of the study?
  - If so, what did you receive?
  - How helpful was it and why do you say that?

BARRIERS QUESTIONS (AAC Supports)**:**

Interviewer: We would also like to learn about what things make supporting *Eli's* AAC difficult.

- What have you found difficult when working with *Eli*'s AAC?
  - Are there things about **this project** (e.g., the team meeting, the coaching, the research requirements like video recording) that make providing AAC support difficult?
  - Are there things that your **school** does that make providing AAC support difficult?
    - If so, what are these things?
    - Why are they problematic?
  - Are there things that your **family** does that make Eli's experience with AAC difficult?
    - If so, what are these things?
    - Why are they problematic?
  - What about your **own knowledge and experience**? Are there aspects of your own experience that makes supporting AAC difficult?
    - If so, what are these things?
    - Why are they problematic?
- Are there any other things standing in the way of feeling successful with *Eli*'s AAC?

EXPERIENCE ON THE TEAM (Experiences as team member)

Interviewer: I'd like you to think about your experiences on *Eli's* educational team.

- Please tell me about your experiences as member of *Eli's* educational team.
    - Probes:
      Has anything changed since the beginning of the school year? If so, what? Why do you think that is?
      Do you feel like you have a role in decision-making on the team? What is that role?
      What experiences have you had with this team that have made you feel good? Not so good?
- How would you define a "good" or "successful" educational teaming experience for you?
    - Probes:
      When you've felt good about your part on your child's educational team, what does that teaming experience look like?
      Even when you don't feel great about how things are going for your child, are there ways that you still can feel good about your team's functioning? If so, what are those ways?

EFFECTIVENESS

- Please tell me about your impressions of how well *Eli's* **team is functioning**.
    - Think about the amount of communication, clarity about roles and responsibilities, general satisfaction with your job as a member of the team.
- At this point in the school year and now that you've participated in both the team meeting and one-on-one coaching, how do you feel about your **own work** with *Eli?*
- How do you feel about *Eli's* communication with AAC?
    - Has it changed since the start of the study?
    - Are you satisfied with these changes within that time frame?

DATA EXAMINATION

I want to show you some of the data that we've generated together to get your impressions of what it means. I am going to show you three graphs and explain each one to you. Then, please tell me what they mean to you, how important they feel in telling your and Eli's story about this past 6 months, and anything else that they bring up for you. [Show and explain graphs of each strategy with child's communication.]

You will have another chance to comment on this, but so far, we have come up with the following statements to explain how the team and Eli have changed over the course of the study:

1. At the very beginning, before the meeting or coaching, we felt that:
   This team is moderately functional, engaging in basic AAC supports that are supporting Eli in developing ownership of his AAC device and exploring it.

2. After the team meeting, we felt that: *Because of the team meeting:*
   This team's functioning improved slightly, exploring more sophisticated, evidence-based teaching strategies for supporting AAC that are helping Eli transition from seeing the device as a ***possession*** *to a* ***distinct tool for communicating.***

- Do these seem accurate to you? What would you add, change, or clarify?
- Can you write a statement that follows the same format to describe how things are now, after coaching and time to practice and work with Eli on your own with what you've received from the supports package?

CLOSING

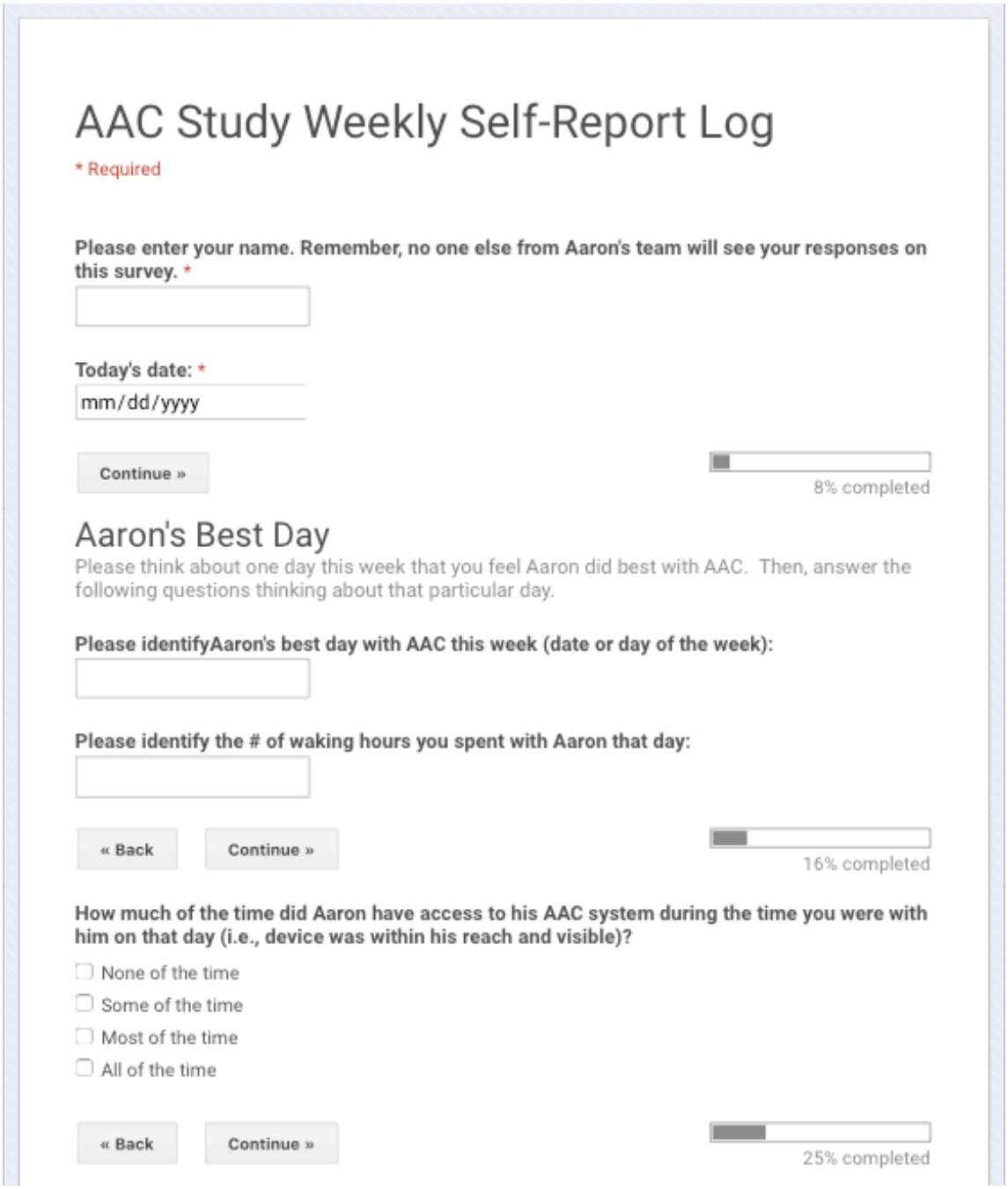
Interviewer: Thank you so much for sharing your experiences. Before we end,

- Is there anything else about supporting *Eli*'s AAC that you'd like to share?
- Is there anything else about the activities of this study that you'd like to discuss or that you think is important for us to consider?

Interviewer: Thank you so much for taking the time to talk to us!

Appendix F

Weekly Self-Report Log



AAC Study Weekly Self-Report Log

* Required

Please enter your name. Remember, no one else from Aaron's team will see your responses on this survey. *

Today's date: *

mm/dd/yyyy

Continue »

8% completed

Aaron's Best Day

Please think about one day this week that you feel Aaron did best with AAC. Then, answer the following questions thinking about that particular day.

Please identifyAaron's best day with AAC this week (date or day of the week):

Please identify the # of waking hours you spent with Aaron that day:

« Back Continue »

16% completed

How much of the time did Aaron have access to his AAC system during the time you were with him on that day (i.e., device was within his reach and visible)?

- None of the time
- Some of the time
- Most of the time
- All of the time

« Back Continue »

25% completed

Aaron's Best Day

While you were with him on that best day:

	0	1 or 2	3 or 4	5 or 6	7 or more
How many times did Aaron communicate with the AAC system on his own?	○	○	○	○	○
How many times did you physically help Aaron communicate with the AAC system (i.e., use the prompting procedure)?	○	○	○	○	○
How many times did you do something to create an opportunity for Aaron to use the AAC system (like asking him a question or arranging the environment and then waiting)?	○	○	○	○	○
How many times did you use the AAC system to model while you were talking to Aaron?	○	○	○	○	○
How many additional adults used Aaron's AAC system (or the matching system) while communicating with him?	○	○	○	○	○
How many different classmates used Aaron's AAC system while communicating with him?	○	○	○	○	○

« Back Continue »

33% completed

Aaron's Best Day

Did you do any maintenance on the AAC system on that day? (Check all that apply.)

- ☐ No
- ☐ Yes, I charged the device.
- ☐ Yes, I programmed the device.
- ☐ Yes, I fixed (or tried to fix) a technical glitch.
- ☐ Other:

« Back Continue »

41% completed

Aaron's Best Day

Overall, what best describes Aaron's communication with the AAC system on that best day?

- [ ] Nonexistent
- [ ] Some attempts
- [ ] Lots of attempts
- [ ] Some successful use
- [ ] Lots of successful use
- [ ] Beyond anything I've seen before!

Comments (optional, but please elaborate if anything was noteworthy on Aaron's best day!)

« Back Continue »

50% completed

The Week Overall

Now think about the week overall. Please answer the following questions thinking about the whole week.

Overall, what best describes Aaron's communication with the AAC system this week?

- [ ] Nonexistent
- [ ] Some attempts
- [ ] Lots of attempts
- [ ] Some successful use
- [ ] Lots of successful use
- [ ] Beyond anything I've seen before!

Comments (optional, but please elaborate if anything was noteworthy this week.)

« Back Continue »

58% completed

Thinking about maintaining the AAC system this week (e.g., programming, fixing glitches, charging, etc.),

	Yes	No	NA - I didn't do any maintenance.
was the amount of time you spent on maintenance burdensome?	○	○	○
did the maintenance activities prevent you and/or Aaron from using AAC in any way?	○	○	○
were any of the maintenance activities you had to do someone else's responsibility?	○	○	○

How much time (in minutes) did you have to spend maintaining the AAC system this week?

Comments:

« Back Continue »

66% completed

Thinking about operating the AAC system this week (e.g., locating vocabulary, adjusting volume, navigating),

	Never	About 1-3 times this week	About once a day	More than once each day	
how often did you lose Aaron's interest because you couldn't find what you were looking for quickly enough?	○	○	○	○	○
how many times did you never figure how to do what you were trying to do/say?	○	○	○	○	○

Comments:

« Back Continue »

75% completed

Thinking about the team of people who support Aaron and his AAC and the events of this week, to what extent are you satisfied with

	1 - Not at all satisfied	2 - Satisfied very little	3 - Somewhat satisfied	4 - Satisfied to some extent	5 - Satisfied
the amount of communication you've had with other team members about AAC?	○	○	○	○	○
the quality of the communication you've had with other team members about AAC?	○	○	○	○	○
the support you've received for AAC from the team?	○	○	○	○	○
the contributions from the rest of the team to Aaron's AAC?	○	○	○	○	○

Comments:

« Back Continue »

83% completed

Thinking about this week, to what extent do you feel

	Not at all	Maybe a little bit	To some extent	Yes, I think so.
your efforts with Aaron are helping him learn AAC?	○	○	○	○
the collective efforts of you and the rest of his team are helping him learn AAC?	○	○	○	○
Aaron is learning to use AAC?	○	○	○	○
you are contributing to Aaron's team?	○	○	○	○
the team is functioning well?	○	○	○	○

Comments:

« Back Continue »

91% completed

Anything else of note about Aaron, AAC, and/or the team this week?

« Back Submit

100%: You made it.

Never submit passwords through Google Forms.

Appendix G

Intervention 1 - Team Forming Meeting Agenda and Procedural Fidelity Checklist

A. Procedural Fidelity Checklist for Intervention 1 Introduction (led by researcher)

Date:	
Starting Time:	Ending Time:
Location:	Participants:
Distraction-free: ☐Yes ☐No	
Sufficient, comfortable seating: ☐Yes ☐No	
Snacks and drinks: ☐Yes ☐No	

Introduction (~15 minutes) – Led by researcher

- ☐ Start video recording.
- ☐ Welcome all participants and state the purpose of the gathering: To work together to create a shared vision and plan for supporting *child*'s communication using AAC.
- ☐ Explain the rationale and the "whole":
  - ☐ Children who use AAC have the strongest long-term outcomes when they have a team of people working together toward common goals around their communicative competence. That includes their language skills, their operational competence with their AAC system, their social skills, and the strategic skills they learn to navigate the numerous barriers they are sure to encounter in their life.
  - ☐ The purpose of the agenda they will use today is to help them form around this common purpose. Teams typically go through four stages: Forming, Storming, Norming, and Performing. At the beginning of a task, the team forms around that task. You are all here because you have a role to play in *child'*s AAC learning. Today, you'll talk through a lot of things that will help you work well together toward common goals. After that, you'll likely Storm. Someone will do something you don't like. Someone else will drop the ball. But, you'll work through all of that as it comes and find your Norm – your ways of addressing conflict and functioning smoothly so that you can Perform the duties of teaming to support *child*'s AAC learning. The goal for today's meeting is to get that process off to a strong start by addressing many things up front.
- ☐ Ask participants to introduce themselves and explain who they are in relation to the child and his/her AAC experience.
- ☐ Give each attendee a copy of the meeting agenda and explain that it is their guide for this meeting. Their task is to discuss all items on the agenda in the next two hours. There are time estimates for each section to help guide them, but they have complete control over how much time they want to spend on any topic. Ask each attendee to take notes in the shaded boxes.
- ☐ Ask team to designate the official minute-taker for the meeting, responsible for recording the consensus of the team and each person's responses for the official record of the meeting. Ask team to designate the official timekeeper for the meeting, responsible for notifying the team when they extend beyond the time estimate for a section.
  - ☐ [Take photo of these minutes at the end of the session for data.]

☐ Turn the meeting over to the team and take notes on the meeting's proceedings. Do not intervene. Complete the AAC Team Forming Meeting agenda as the team works, taking notes about their conversations.

B. AAC Team Forming Meeting Agenda (for use by participants and for procedural fidelity)

AAC Team Forming Meeting Agenda
(for use by participants)

Meeting about AAC for: _____
(child's name)

People Attending	**Role**
Me:	

Official meeting minutes are being recorded by: _____

Directions: As a team, discuss all of the items on this agenda in the next two hours, using the boxes to the left to check off each item as you address it. There are time estimates for each section to help guide you, but you have complete control over how much time you want to spend on any topic. The shaded boxes are for your notes.

1. Building the Foundation (~20 minutes)

☐ 1.1. No one person can successfully support *child*'s communication development and AAC; a team effort is necessary for success. Solid partnerships are built on a strong foundation. The foundation of partnerships is comprised of clear communication and a willingness to address the uncomfortable. The purpose of this first discussion topic is to get to know one another and develop plan for communicating with one another to support *child*'s AAC use.

☐ 1.2. First, let's acknowledge the important role the family plays in the child's life. *Family members,* you will be a part of *child*'s life far beyond the time each of the professionals that are here with you today get to spend with him/her. *Professionals*, your time with *child* is temporary and short-term. Because of this, *family members*, you have the final say in every decision we make. These team members are here to support and advise you, but, ultimately, you get to tell the team what will work for you and your family.

- ☐ *Team members,* do you agree to support and advise this family to the best of your ability and fully support their decisions and choices for their child?
- ☐ *Family members,* do you agree to listen to and consider the advice of the team and clearly communicate your preferences and choices about your child's education and AAC to the team so they can support you?

☐ 1.3. Now let's think about the Big Picture. Discuss the following questions. It may be helpful to have someone write notes on a whiteboard/paper on the walls as well. Document the team's final answers in the shaded boxes.

☐ 1.3.1. Question 1: In only five words, what is our philosophy toward augmentative and alternative communication?

Guiding thoughts: Thinking about what we each know, your own individual beliefs and values, and our unique experiences, discuss our philosophical perspectives about AAC as they relate to *child*. For example, each person may share statements that begin with, "I believe that AAC is..." or "I think that AAC should…" As each person shares, listen to one another and discuss differences. Together, come to consensus about how you will approach AAC for *child*.

Final Answer: In only five words, our **philosophy** toward augmentative and alternative communication is… _____

☐ Given this shared philosophy, come up with **three examples** of what enacting this philosophy would look like in the different settings *child* spends time in.

_____

_____

_____

☐ 1.3.2. Question 2: What is our biggest hope for *child's* communication through AAC?

_____

_____

_____

Guiding thought: Think about *child* and his/her use of AAC.

☐ Each team member brings a unique set of knowledge, talents, and perspectives that will make our efforts toward seeing this hope realized stronger. Let's identify these strengths to help us as we move forward. Please share three strengths you bring to the team.

Team Member:	**Strengths:**
	1. 2. 3.
	1. 2. 3.
	1. 2. 3.
	1. 2. 3.

	1. 2. 3.
	1. 2. 3.
	1. 2. 3.
	1. 2. 3.

☐ 1.4. Now that we've identified our Big Picture hope, let's acknowledge the hard work realizing that will take and that working together to support *child's* AAC can get tricky. Please share two things the other members on the team can do to support the team's efforts. Record those supports here and provide an example for each support. For example, someone might say, "*To support my role on the team, my team members can set clear deadlines for me. For example, you might: say, "Please send us your section of the evaluation report by Friday at 9:00 am. Does that work for you?"*

Team Member:	**Supports:**
	To support my role on the team, my team members can: 1. _____ . For example, you might: _____ 2. _____. For example, you might: _____
	To support my role on the team, my team members can: 1. _____ . For example, you might: _____ 2. _____. For example, you might: _____
	To support my role on the team, my team members can: 1. _____ . For example, you might: _____ 2. _____. For example, you might: _____

	To support my role on the team, my team members can: 1. _____ . For example, you might: _____ 2. _____. For example, you might: _____
	To support my role on the team, my team members can: 1. _____ . For example, you might: _____ 2. _____. For example, you might: _____
	To support my role on the team, my team members can: 1. _____ . For example, you might: _____ 2. _____. For example, you might: _____
	To support my role on the team, my team members can: 1. _____ . For example, you might: _____ 2. _____. For example, you might: _____

☐ Let's keep our strengths and these support strategies in mind as we complete our work today.

2. Specifying the Goal (~15 minutes)

☐ 2.1. Let's return to our biggest hope for *child*. We agreed that our hope is

_____

(*repeat from above)*

☐ 2.2. Our next task is to figure out our first step toward realizing that dream. Let's see if we can identify an AAC goal for <u>this year</u> that is both **positive** and **possible**. Let's brainstorm. What important results toward realizing that hope do we think we can accomplish this school year? At this time next year, what accomplishments related to AAC will we be sharing with the group? What does *child*'s communication look like a year from now?

Guiding thoughts: Think communication – things *child* will be able to say via AAC. For example, "*Child* will carry his device throughout the day" is an important aspect of learning to use AAC, but does not address his actual communication. Instead, think about things like: What words do we want *child* to be using on the device? What functions of communication (e.g., request, comment) do we want *child* to express using AAC? What will a successful communication act via AAC look like one year from now?

Brainstorm Notes: _____

Our AAC goal(s) for this year:

3. What's Already In Place (~15 minutes)

☐ 3.1. Now that we have a positive and possible goal for this year! Let's return to the present and identify where we are right now.

☐ 3.2. Describe *child*'s communication skills right now.

☐ With AAC:

☐ With other forms of communication:

Guiding thoughts: How does *child* let you know what s/he wants? How does *child* let you know when s/he doesn't want something? How does *child* get your attention?

☐ 3.3. Describe *child*'s current AAC system(s) and related equipment (e.g., mount for wheelchair; carrying case for symbols/device).

☐ 3.4. Describe the vocabulary that is available to *child* on those systems.

☐ 3.5. Each person here: Describe any strategies you are using to teach *child* to use AAC.
Strategy 1.

Strategy 2.

Strategy 3.

Strategy 4.

Strategy 5.

Additional notes:

4. What Needs to Be in Place (~25 minutes)

☐ 4.1. To meet our goal for the year, are there changes or additions we need to make to:

☐ 4.1.1. The AAC system(s)?
☐ No
☐ Yes:

Changes (as action steps):	Person(s) responsible:	Due date:

☐ 4.1.2. The available vocabulary?
☐ No
☐ Yes

Changes (as action steps):	Person(s) responsible:	Due date:

☐ 4.2. We identified several strategies that we are using to help *child* learn to use the AAC system. [Review strategies shared in Item 3.5.] Let's evaluate them.

☐ 4.2.1. For each strategy we are already using:

	Does this fit with our goal for this year (see Item 2.2)?	Is this an evidence-based practice for teaching AAC?
Strategy 1	☐ Yes ☐ No	☐ Yes ☐ No ☐ Not sure
Strategy 2	☐ Yes ☐ No	☐ Yes ☐ No ☐ Not sure
Strategy 3	☐ Yes ☐ No	☐ Yes ☐ No ☐ Not sure
Strategy 4	☐ Yes ☐ No	☐ Yes ☐ No ☐ Not sure
Strategy 5	☐ Yes ☐ No	☐ Yes ☐ No ☐ Not sure

☐ For each strategy marked "yes" to both questions, discuss how the strategy is used and make sure everyone on the team feels confortable using it.
Notes:

4.2.2. There are three simple strategies that help children learn to use AAC.

☐ **Aided AAC Modeling** – Children learn language by hearing others use it. Because child is learning to use language through AAC, hearing others communicate this way will help *child* learn. This strategy means that you use AAC to communicate to *child* to model how it works. It has three steps: (1) **Touch** the symbol or symbols you want to say on the AAC system, (b) **label** (or let the speech synthesizer label) each symbol, and (c) give a spoken model using correct grammar and sentence structure to **expand** the message. For example, if you are playing blocks with *child* and you are going to knock over the tower you just built, you could touch the symbols for *GO* and *DOWN*, saying each word as you touch them (or letting the device say them), and then say, "The block are going to *go down*!"

☐ Watch a short video clip of Aided AAC Modeling in action.

☐ Let's rehearse the steps in the strategy aloud. Say, "**Touch, label, expand**." Repeat this out loud three more times. Saying it out loud will help us remember the steps and use this strategy with *child*.

☐ **Creating Opportunities** - To learn language, children need lots of opportunities to practice. There are two simple strategies that can help you create opportunities. First, you can use *environmental arrangement,* which means that you do something to the environment that creates an opportunity for the child to communicate. For example, you can place *child*'s favorite toy just out of reach so he has to use his AAC system to ask for it (that's environmental arrangement). Second, you can use *mand-model*. A mand is a question, choice, or direction to give the child a chance to communicate. For example, you could ask, "What did you see outside?" (question) or "Do you want pancakes or apples?" (choice), or you could tell him, "Say more" (direction).

With either environmental arrangement or mand-model, once you've set up the opportunity, you must look expectantly at *child* and **wait** at least 5 seconds to see if *child* will communicate via AAC or through his actions.

- ☐ Watch a short video clip of creating opportunities in action.
- ☐ Let's rehearse the steps in the strategy aloud. Say, "**Arrange and wait**." Repeat this out loud three more times. Saying it out loud will help us remember the steps and use this strategy with *child*.

☐ **Systematic Prompting** – To learn how to operate their AAC system while also learning language, children benefit from prompts delivered in a systematic way to help them develop the skills to do so independently. Systematic prompting procedures have been developed, tested, and proven to be very effective in teaching children new and complex sills. The key to using them with AAC is always **following the child's lead.** That means that you'll only prompt if the child does something that let's you know what he wants to say. For example, if he reaches for the cup that is out of reach, you can teach him to use his AAC system instead by interrupting that reach with a prompt to use the device.

For *Child*, the most-to-least prompting strategy seems best. This means that you start by giving him prompts that guarantee he will say what he wants to say on the device and then fading those prompts over time to give him less and less help until he can do it all on his own.

- ☐ Please review the provided flowchart with the steps to the procedure.
- ☐ Watch a short video clip of most-to-least prompting in action.
- ☐ Let's rehearse the steps in the procedure aloud. Take turns reading the flowchart out loud with a partner. Each partner should read it aloud twice.

☐ 4.3. Let's make a plan for using these strategies with *child*. What data will we take to see if we are using them correctly and if they are working for *child*?

Guiding thoughts: What can we do to check our use of these strategies? A checklist? A data sheet? What can we do to monitor *child*'s progress toward the communication goal we set?

☐ To make sure we are all using the strategies with *child* and using them correctly, we will:

List all team members who are responsible for doing this:

☐ To monitor *child*'s progress toward the AAC goal(s), we will:

☐ 4.4.1. Now let's think about our own knowledge and skills. What is each of our biggest fear about helping *child* learn to use AAC?

Team Member:	**Fear:**

☐ 4.4.2. Let's brainstorm ways to help alleviate these fears.

Team Member:	**Actions to help alleviate that fear:**	**Person(s) responsible:**
's fear		
's fear		
's fear		
's fear		
's fear		

☐ 4.5. Are there any other supports anyone needs to help us meet our goal or help maintain momentum toward that goal?

☐ No

☐ Yes:

Additional Supports:	**Person(s) responsible:**

5. Committing to the Plan (~15 minutes)

☐ 5.1. We have all done a lot of work to identify our collective dream, a short-term goal, evaluate and adjust the AAC system and vocabulary, and put a plan in place for getting the supports we each need to meet our goals and move toward realizing that Big Picture hope together. We have each made some compromises to reach consensus. Before we each commit to the plan and discuss next steps, does anyone have any additional concerns about the current plan that we need to discuss?
☐No ☐Yes:

☐ 5.2 Let's review the action steps, people responsible for each step, and the due date for each to make sure everyone knows their task, no one has too much on their plate, and everyone has a role to play.
Review 4.3-4.5 above and adjust as needed.

☐ 5.3. As we get ready to put this plan in place, let's also make a plan for communicating with one another about how things are going.

☐ 5.3.1. How often will we meet to check in with one another? _____

☐ 5.3.2. Our next meeting will be on _____ at _____ at _____.
(date) (time) (location)
Who will be there:

What data we will bring:

☐ 5.3.3. What are 5 meeting Dos and Don'ts that will make the meetings go smoothly and help everyone feel comfortable? *For example: 1. Do come prepared with materials. 2. Do come to the meeting on time.*
_____

☐ 5.3.4. How will we communicate with one another in between meetings?

Team Member:	**Keep me in the loop by (preferred method of contact and needed contact information):**

☐ 5.3.5. Who is the "point person" for the team – the person to contact if something comes up, maintaining records, responsible for contacting other team members, etc.? _____

☐ 5.4. We have all done incredible work here today. If there are no other concerns or topics we need to address, our final task is for each of us to agree to this plan, committing our support to the goals of the team for the benefit of *child*.
Discuss any additional concerns and then each member signs the official meeting minutes as a sign of their commitment to supporting the child's AAC.

By signing below, I commit to this plan and to my role on this team, in the hope of helping* child *realize his/her full potential as a communicator.

Signatures:	**Role:**

☐ _____ will send copies of the official meeting minutes to each team member by _____.
(date)

Appendix H

Integrating the Literature Review into Interventions 1 and 2

In this appendix, I provide detailed explication of how the literature review was used to inform the development of Interventions 1 and 2.

First, I present a table that outlines how the Team Forming Meeting agenda for Intervention 1 reflects the literature reviewed in Chapter 2. The sections of the agenda are listed in the first vertical column with item numbers corresponding to those listed in the agenda that appears in Appendix G. The major subheadings from the section in Chapter 2 labeled "Supports for Team Functioning" are used as headings for the second, third, and fourth columns in the table to direct readers to the appropriate portion of the review. Then, the minor subheadings and references to the narrative are listed in the cells that correspond to the section of the meeting guide to which it contributed. For the procedures in the proposed study, only the initial forming meeting will be prescribed. The protocol encourages the team to schedule and plan for additional meetings but these will not be required during the course of this study.

Connecting the Review of Efficacious Supports for Teaming in Chapter 2 to Intervention 1 of the Proposed Study

	Supports for Team Functioning Chapter 2 Review Section		
Forming Meeting Guide Sections (Appendix G)	**Challenges (or supports) to AAC team functioning**	**Theory and principles to support AAC team functioning**: Collaborative Teaming in Schools	**Interventions to support AAC team functioning**
Introduction, Item 1		*Building team structure*: (c)	
Building the Foundation			
Item 1	Professional development		
Item 2[a]		*Learning teamwork skills:* (f)	
Item 3, Questions 1 & 2	Philosophy	*Building team structure:* (b) (c) (d) (g) *Learning teamwork skills:* (d) *Problem solving and action planning:* (I)dentify problem	
Item 4	Interpersonal skills	*Building team structure:* (b) (d) (f) (g)	
Specifying the Goal			
Item 1		*Building team structure:* (c) *Problem solving and action planning:* (G)enerate	
Item 2		*Learning teamwork skills:* (d) (g)	
What's Already in Place		*Problem solving and action planning:* (N)ote	
What Needs to Be in Place			
Item 1		*Problem solving and action planning:* (I)dentify solutions	
Item 2	Professional development	*Problem solving and action planning:* (T)arget	
Item 3		*Problem solving and action planning*: (E)valuate	UPS data collection (Hunt et al., 2002)
Item 4	Interpersonal skills	*Building team structure:* (b) (d) (e) (g)	
Item 5	Context	*Building team structure:* (d) (g)	
Committing to the Plan	Commitment	*Learning teamwork skills:* (a)-(i)	
Item 1		*Building team structure:* (g)	
Item 2		*Building team structure:* (d) (g)	
Item 3		*Building team structure:* (f) (g)	
	Context	*Learning teamwork skills:* (h)	

Note. Item numbers reference meeting protocol demarcations in Appendix G. Letters in parentheses reference in-text narrative that corresponds to that subheading and letter in this section. [a] also addresses *School and family partnerships*.

Additional components of the agenda were developed based on the literature reviewed in the section, Supports for Teaching Adults to Instruct Children in AAC Use, in Chapter 2, displayed in Figure 16. The agenda includes guidance in identifying evidence-based practices that fit with the goals the team identifies and a description of the steps, a model of the strategy being used, and the opportunity for team members to verbally rehearse the strategy steps (i.e., Steps 2-4 from Kent-Walsh & McNaughton, 2005 and "first whole" from Knowles et al., 2015; see Figure 16 and "What Needs to Be in Place," Item 2 in agenda). The Protocol also includes guidance in planning for using those practices (see "What Needs to Be in Place, Item 3 in agenda), identifying the supports the team will need to implement their plan (see Figure 16 and "What Needs to Be in Place," Items 4 & 5 in agenda), and establishing consensus and commitment to the plan (see "Commitment to the Plan" in agenda). Finally, the agenda was informed by the person-centered planning PATH process (Pearpoint, O'Brien, & Forest, 1993), the procedures set forth by Light and Binger (1998) for AAC implementation, and a team forming meeting process, based on Tuckman and Jensen's (1977) model of team development, that was developed and piloted by Stark (2014).

Figure 16 also details how Intervention 2, one-on-one coaching for AAC Facilitators on the team, is designed to incorporate the literature review in the section, Supports for Teaching Adults to Instruct Children in AAC Use, in Chapter 2. The five characteristics of coaching identified by Rush and Shelden (2011) and Step 6 (i.e., practice in authentic settings) of the Communication Partner Instruction model (Kent-Walsh & McNaughton, 2005) are incorporated into the coaching protocol, available in Appendix J. This is done to support the team members in learning the "parts" (Kretlow et al., 2011), or instructional strategies, that make up successful supports for a child with intellectual disability who is learning to use AAC. In addition, during

the first coaching session, each team member will be asked to practice using the identified instructional strategies in a role play with the coach, thus incorporating Step 5 (i.e., practice in a controlled setting) of the Communication Partner Instruction model (Kent-Walsh & McNaughton, 2005) (see Figure 16).

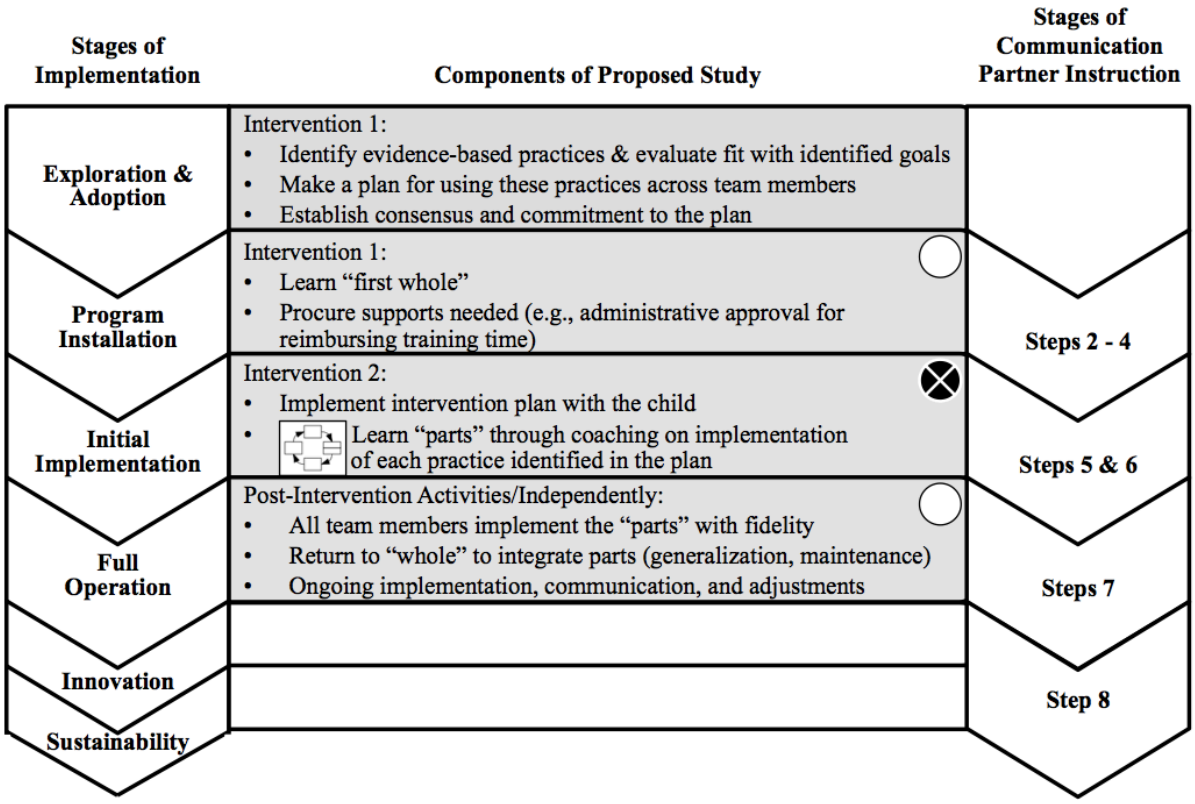


Figure 16. Representation of connections between review content and components of the proposed study. Stages of implementation from Fixsen et al. (2005). Stages of communication partner instruction from Kent-Walsh & McNaughton (2005). Under Components of Proposed Study, circles represent phases of the Whole-Part-Whole learning model for incorporating adult learning principles into instruction (Knowles et al., 2015), and the square figure represents the five characteristics of coaching (Rush & Shelden, 2011).

Appendix I

Coding Manual

Context: We are coding 5-minute segments of video from 5 adults.

- We are measuring three adult dependent variables:
  (1) rate of aided AAC models,
  (2) rate of opportunities given, and
  (3) fidelity of prompting procedure use.
- We are measuring one child dependent variable:
  (1) successful communication acts with AAC.

Setting up to code:

- Identify the video and the 5-minute time stamp to be coded from the participant's Progress Table on Box.
- Download the corresponding video file and open it with QuickTime 7.
  - QuickTime 7 allows you to play the clips at ½ speed, which may help with capturing events. To do this, go to: Window→Show A/V Controls. Then, look for "Adjust Playback Speed" and adjust to ½ time.
- Code the 5-minute time stamp in a Word document.
  - In Box, locate the file titled *Data Collection Sheet – AAC Teaming and Instruction Study.*
  - Click on the down arrow next to the file and select "Move or Copy."
  - Click "Copy."
  - Rename the new file using the following format:
    - ParticipantCode_RoutineCode_MM-DD-YYYY_XXPrimary
      - E.g., ParaM_IR_09-29-2015_KJPrimary
      - E.g., ParaM_IR_09-29-2015_GJSecondary
      - E.g., Mom_GR_10-10-2015_MSPrimary
  - Use this renamed file to record codes for this observation.
- REMEMBER: Delete the video file from your computer after coding is completed.

Rule about time stamp:

If an event begins within the time stamp to be coded but the sequence of events continues after that time stamp, DO NOT code this event. Similarly, if an event starts before the time stamp and continues into the time stamp to be coded, DO NOT code this event. Only code events in which the entire event falls within the 5-minute time stamp to be coded.

*It may be helpful to watch 10 seconds before and after the clip to see if something extends beyond the time stamp.

Voice Output Rule:

If the device's voice output isn't working, to code an event, the following must be true:

- You can see the screen of the device.
- You can see what icons the adult/child touches
- The adult speaks the items out loud as they are touched.

Thus, if it's not working, it's unlikely that you can code any events. Mark this on the data sheet.

Data Sheet:

The data sheet looks like this, with the listed codes available for each column.

Event Time Stamp	Strategy	Prompting Fidelity Code	Child Communication Behavior	Topography of Child's Communication	2nd Topography of Child's Communication	Adult Response	Notes
X:XX	• *AAC model* • *Opportunity* • *Prompting*	• *1* • *2* • *3* • *4*	• *Response with AAC* • *None with AAC* • *Initiation with AAC*	• *Ind. AAC Correct* • *Ind. AAC babbling* • *PP AAC* • *Elbow AAC* • *PPA AAC* • *FPA AAC* • *Nonsymbolic* • *None*	*Same*	• *AAC Model* • *Opportunity* • *Prompting* • *Feedback* • *None*	

The rest of this document explains the rules for assigning these codes to events in the video clips.

Adult DV 1: Rate of Aided AAC Models

Identifying the event (Column 1: Time Stamp of Event, Column 2: Strategy = *AAC model*):
To determine if an adult provides an aided AAC model to the child, identify the time on the video clip that the adult used the AAC system (or identical second system; the black iPad) to do **both** of the following:

(a) Activate at least one symbol on the AAC system
(b) Provide a spoken expanded model that uses at least one additional word not included in the AAC message.

Record the time the adult touches the device (what you can see) whenever possible. If you cannot see, then record the time you hear the device speak. If you cannot see or hear, don't code.

If the child and the adult are both using the device at the same time, this is poor use of modeling. Do not code. (Messy models don't count. ☺)

One event = All of the words spoken with the device (including mistakes made) until the adult stops touching the device for at least 5 seconds OR changes the topic.

If the voice output on the device is not working and/or inaudible, do not code unless you can see the screen of the iPad, see what symbols are touched, AND the adult speaks for the device. [It is unlikely you can code events if the voice output is not working/inaudible. In this case, upload a data sheet for that day with a note on it that explains why there are no/few codes.]

***Examples of an aided AAC model*:**

1. The adult says, "I like pizza." and touches the symbols that correspond with the underlined word.
2. The adult touches the symbol for "go" on the AAC system and then says, "I want to go to the gym."
3. The adult says, "Go home." and touches the symbols that correspond with the underlined word.

Nonexamples of an aided AAC model:

1. The adult touches the symbol for "go" on the AAC system and then says, "Go." (Must expand on the AAC model by saying at least one more word.)
2. The adult touches the symbols for a message on the AAC system but does not speak. (Must model speech and expand on the AAC model by saying at least one more word.)

Example data sheet:

Event Time Stamp	Strategy	Prompting Fidelity Code	Child Communication Behavior	Topography of Child's Communication	2nd Topography of Child's Communication	Adult Response	Notes
1:27	*AAC model*		*Use rules below*	*Use rules below*	*Use rules below*	*Use rules below*	*Note what model was given, when possible*

Calculating rate of aided AAC models:
To calculate the rate of aided AAC models given in an observation, count the total number of "*AAC model*" events in *Column 2: Strategy* and divide by the total length of the video clip (usually 5 minutes). If the video clip is 3:48, the length of the clip is 3.8 (48/60 = .8 + 3 = 3.8 minutes).

Adult DV 2: Rate of Opportunities Given

We are defining "opportunities" as the adult's use of two strategies together:
Environmental Arrangement (EA) or Mand-model (M) + Time Delay (TD)

Identifying the event (Column 1: Time Stamp of Event, Column 2: Strategy = *Opportunity*):
To code an opportunity using the code *"Opportunity*," three things must happen:

(a) Joint attention – The adult and the child must be attending to the same thing (e.g., looking at each other; looking at the same toy).

(b) Environmental arrangement – The adult must do something so that the child must need to communicate (including a verbal mand/question) to get what he wants or respond AND must be able to access the AAC system (e.g., system is placed within the child's reach; the system is in a location from which the child can easily retrieve it).

    a. Examples, assuming the device is within the child's reach:
        i. The adult moves the snack just out of the child's reach.
        ii. The adult ignores the child tugging on their arm.
        iii. The adult blocks the door so the child cannot leave the room before saying "goodbye."

OR

Mand-model – The adult asks a question, gives a choice, or gives a direction for a communication act that the child can respond to AND the child can reach the system

    a. Examples, assuming the device is within the child's reach:
        i. The adult says, "Tell me about your family." (direction)
        ii. The adult says, "Who are your brothers?" (question)
        iii. The adult says, "Do you want pretzels or apples?" (choice)
    b. Do not include directions for noncommunicative behaviors, like, "Get your backpack." Or "Clean up the toys."

(c) Time Delay – After using EA or MM, the adult must:

- **look expectantly** at the child, using body language that indicates it's the child's turn to communicate, AND
- maintain **silence** (i.e., no talking, humming, etc.), AND
- refrain from prompting (e.g., physical assistance, point prompt)

for at least 5 seconds OR, if the child responds within those 5 seconds, provide relevant feedback.

Note. The child's response starts a new line if the adult responds with a strategy. So, if the adult creates an Opportunity, the child reaches, and the adult keeps holding the toy out of reach, this is a second Opportunity coded on a new line (assuming they meet the above criteria).

If the child has the opportunity to respond via a nonsymbolic method (e.g., grabbing the desired item), DO NOT code as an event. For example:

- The child can reach and take the crayons he wants without having to ask for them.
- The child can get the adult's attention by pulling on her arm without having to say "hi."

***Examples of an opportunity*:**

1. The child's snack is in a sealed Ziploc bag on the table and the AAC system is within his reach. The child is looking at the bag and reaches for it. The adult looks at the bag and then looks at the child expectantly. The adult says nothing for 5 seconds and then says, "What do you want?"
2. The child is tugging on the adult's shirt and holding his device. The adult looks at the child expectantly and says nothing for 5 seconds. Then, the adult says, "Hi, *Child*. What do you need?"
3. The adult removes the crayons from the table and holds them in her hand. The child reaches for another crayon but they are not there. The adult leans forward, shows the crayons to the child, and silently waits for 7 seconds while looking expectantly at the child, whose device is within his reach. Then, the adult says, "More crayons?"
4. The adult hold up a block and a book and asks, "What do you want?" Then, waits silently for 7 seconds before saying, "Let's play with blocks."

Nonexamples of an opportunity:

1. The child's cup is sitting on the table in front of the child. The child looks at it and the adult silently looks expectantly at the child for 4 seconds. The child picks up the cup and takes a drink. [No environmental arrangement/mand-model - Child must need to communicate for access to the cup.]
2. The child is tugging on the adult's shirt. The adult looks at the child expectantly for 2 seconds and then says, "Hi, *Child*!" [No time delay – Must silently wait at least 5 seconds.]
3. The adult removes the crayons from the table and holds them in her hands. The adult says, "Goodness, what a pretty picture you're making! I hope you keep coloring." The child reaches for the crayons, and the

adult says, "You want more crayons?" [No time delay – Must be silent for at least 5 seconds or silent until child gives a response]

4. The adult makes sure the device is within reach and then takes the play dough away. The child is watching the other kids talking and doesn't notice that his play dough is gone. The adult looks at him expectantly for 5 seconds and then prompts him to say "more" with his device. [No joint attention – Child and adult must be paying attention to the same thing.]

Example data sheet:

Event Time Stamp	Strategy	Prompting Fidelity Code	Child Communication Behavior	Topography of Child's Communication	2nd Topography of Child's Communication	Adult Response	Notes
1:27	*Opportunity*		*Use rules below*	*Use rules below*	*Use rules below*	*Use rules below*	

Calculating rate of opportunities:

To calculate the rate of opportunities given in an observation, count the total number of *"Opportunity*" events in *Column 2: Strategy* and divide by the total length of the video clip (usually 5.0 minutes). If the video clip is 3:48, the length of the clip is 3.8 (48/60 = .8 + 3 = 3.8 minutes).

Adult DV 3: Percent of High-Fidelity Prompting Strategy Use

We are using most-to-least prompting procedures with the following prompt hierarchy:

- Full physical assistance (FPA)
- Partial physical assistance (PPA) – e.g., from wrist
- Prompt from elbow (Elbow)
- Point prompt (PP)
- Independent

Identifying the event (Column 1: Time Stamp of Event, Column 2: Strategy = *Prompting*):

To determine if a prompting procedure was used and needs to be coded, identify the time on the video clip that a **nonverbal** prompt was delivered to the child to direct him toward his AAC device (i.e., at first application of one of the four prompts listed above).

Examples of prompts:

1. Pointing to or tapping the device and/or a specific symbol on the device (PP).
2. Tapping his elbow toward the device or guiding him from the elbow to touch the symbol (Elbow)
3. Guiding him from his wrist to select an icon on the device. (PPA)
4. Giving full physical assistance (hand-over-hand) to select an icon on the device. (FPA)

Nonexamples of prompts:

1. Modeling AAC use to communicate to the child. For example, the adult tells the child, "I like watching Elmo" while touching the icons for "like" and "Elmo" on the AAC system.
2. Verbal prompts, like, "Use your talker," or "what do you want?" or "tell me." *Note.* If a prompt from the hierarchy is paired with a verbal prompt, include as an event.
3. Physically prompting the child to do other behaviors (e.g., match the bowls) or prevent other behaviors (e.g., holding hand to prevent from grabbing food). If these physical prompts are followed by prompting, use the time stamp at which the prompting for AAC started (not physical touch/prompting for other purposes)

Beginning to physically prompt the child to use AAC but stopping before completing the sequence. Sometimes, when A resists the physical prompt or the adult realizes they've made a mistake, the adult may stop the process of prompting. In this even, DO NOT CODE.

a. If the adult stops prompting and then restarts (e.g., after adjusting their position, moving the device, waiting for the child to pay attention), code this event, using the time stamp associated with the second

time they touched the child only (no coding for the interrupted first time). Then, only check the first box below if they had the child engage in the behavior again.

i. Example: The child reaches for the food. The adult interrupts with FPA and then realizes the device is too far away and lets go. DO NOT CODE YET. The adult moves the device closer and then takes the child's hand and completes the prompting. CODE using the time the adult touches the child's hand the second time. Do not check Box 1 below because the child did not reach a second time (the adult is no longer interrupting a behavior with the prompt).
ii. Example: The child reaches for the food. The adult interrupts with FPA and then realizes the device is too far away and lets go. DO NOT CODE YET. The adult moves the device closer while the child continues to reach toward the food. The adult then takes the child's hand and completes the prompting. CODE using the time the adult touches the child's hand the second time. Check Box 1 below because the child was reaching a second time and the adult is interrupting that behavior with the prompt.

If the adult prompts for a word that does not match the behavior they interrupted (e.g., MORE after the child hands them something → this should be HELP; A hits a different word), the adult should either:

1. Silently correct the error with a prompt for the correct word
2. Give feedback for the word selected and create a new opportunity

If they don't, they cannot get the "

Coding the fidelity of the prompting procedure use (Column 3: Prompting Fidelity Code = *1, 2, 3, or 4*):
The fidelity of the participants' use of most-to-least prompting procedures is based on the fidelity with which they implement the steps and will be coded on a 4-point scale. For each event, determine if the participant:

☐ Interrupted the child's nonsymbolic communication (or attempt at AAC use – e.g., tapping on screen) with a prompt
- For example, the child reached and the adult interrupts with PPA.
- Do not check this box if the child has not engaged in nonsymbolic communication.
  - For example, the adult wants the child to ask for "more" play dough but the child is distracted by other kids and does nothing. If the adult goes ahead and prompts the child to say "more," do not check this box.
  -

☐ Delivered the appropriate prompt silently (i.e., used the correct prompt in the hierarchy based on fading schedule and probe performance)
- "Appropriate" requires that the prompt is delivered for all of the steps to get to the desired word on the device from the home page. (e.g., FPA to touch, "Chat Words," then "more" – If adult touches Chat Words for him and then FPA for "more," do not check this box.) Adult may clear other messages or return to home page before prompting him. Requires prompting for at least 2 hits, unless prompted to say LET'S GO.
- "Appropriate" also requires that the adult prompts for the word that matches the interrupted behavior:
  - "Hello"/"Goodbye" = Wave, approach, or track another person (often out of camera)
  - "Let's go" – Hand-leading
  - "Done" – Pushing/leaving/rejecting
  - "Help" – Hands something to you
  - "More" – Reaching
- If the adult talks to the child while delivering the prompt from the hierarchy, do not check this box.

☐ Interrupted any child **errors** with the controlling prompt (i.e., FPA)
- It's ok if the child makes an error, as long as the adult is trying to interrupt it (moving quickly but just doesn't get there in time)
- Also check this box if the child does not make any errors, including when receiving FPA.
- This is most likely after the adult has started to fade prompts. If the adult gives an elbow prompt and the child starts to reach for the play dough, the adult must interrupt this reach with FPA to touch the symbol on device.

☐ Gave verbal and consequence feedback that directly addressed the child's message
- E.g., "You want more!" (verbal) and gives more pancakes (consequence)

- Do not check this box if the adult only gives consequence feedback or only gives verbal feedback.
  - UNLESS: If the child is seeking attention and the consequence feedback is also verbal feedback, check this box.
    - E.g., The child is pulling on the adult's arm. The adult prompts correctly to help the child say "hi" and then says, "Hi, *Child!* How are you?" – Check this box
- Do not check this box if the adult responds with another strategy (e.g., AAC model). The adult must provide immediate feedback to the child's message in the form of verbal/consequence feedback.
  - Example: Prompts child to say "more" and then says, "You want more MORE food FOOD," modeling the words in caps on the device. This is incorrect feedback. The adult should just say, "You want more food" and give the child a bite. If the adult says this, gives the child a bite, and then models, you should check this box (i.e., model came after correct feedback)

Then, assign a score in *Column 3: Prompting Fidelity Code* as follows:

A. **1** – Only one box could be checked.
B. **2** – Only two boxes could be checked.
C. **3** – Only three boxes could be checked.
D. **4** – All four boxes could be checked.

Example data sheet:

Event Time Stamp	Strategy	Prompting Fidelity Code	Child Communication Behavior	Topography of Child's Communication	2nd Topography of Child's Communication	Adult Response	Notes
3:47	*Prompting*	*1 OR 2 OR 3 OR 4*	*Use rules below*	*Use rules below*	*Use rules below*	*Use rules below*	*Note what boxes could not be checked*

Calculating percent of high-fidelity use:
Count the total number of *"Prompting*" events in *Column 2: Strategy* (y). Count the total number of times the adult used the procedure with a score of "*4*" in *Column 3: Miscellaneous* (x). Divide x/y.

If the adult uses the procedure 9 times but only gets a score of four on two of these: 2/9 = 0.222 = 22.2%

Child DV 1: Successful Communication Acts

The definition of successful communication acts will be determined at a later date. For now, we are coding two possible features of success:

1) AAC use, and
2) Topography of communication act.

Identifying the event (Column 1: Time Stamp of Event, Column 4: Child Communication Behavior = *Response with AAC, Initiation with AAC, None with AAC*):
A majority of these events will be recorded on the same line as an adult's strategy use. In this case, the only options are:

- ***Response with AAC*** - If the child attempts communication with the AAC in response to an adult's strategy use (i.e., within 5 seconds of *AAC Model, Opportunity, or Prompting*), code this in the same line as the adult's behavior.
- ***None with AAC*** – If the child does not respond with AAC to an adult's strategy use, code this on the same line as the adult's behavior.

IF the adult has not used a strategy (i.e., *AAC model*, *Opportunity [\even if silent]*, or *Prompting*) **AND** if there has been silence for at least 5 seconds and the child uses AAC, this is coded on its own line as:

- ***Initiation with AAC***

- *NOTE!* To identify the **time stamp** of the child's initiation with AAC, record the time stamp of when you hear the device speak. This is different from how we are identifying the time stamp for an adult's AAC model.
- *Note.* When the child is a member of group instruction (e.g., during calendar, during art class), do not code initiations. We are considering the teacher's instruction to the group and the children's comments communication to which he could respond (but we don't code that).

One event = however many words/mistakes the child makes until he stops touching the device for at least 5 seconds OR changes the topic and no adult speaks/does anything.

Identifying the topography of the communication act (Column 5: Topography of Child's Communication and Column 6: 2nd Topography of Child's Communication):
Regardless of the code used above, identify the topography of the child's response using the following codes:

a. **Ind. AAC Correct** – (Independent AAC Correct) The child independently (i.e., without any prompts from the adult) delivers a message that corresponds to the situation and elicits an acceptable response (i.e., the child does not protest to the consequences of his message)
b. **Ind. AAC Babbling** – The child independently (i.e., without any prompts form the adult) delivers a message via AAC but it is unclear if it was intentional, related to the situation/child's desires, and/or was the message the child wanted to share (e.g., the child protests to the consequences of his message, leading to questions about its accuracy; child is holding device and may accidentally have activated a message) OR (i.e., Words From Heaven prompt) The child delivers a message via AAC after an adult has pushed some buttons to get him to the desired page or the child pushes the top of the screen where previously built messages remain in the top row of the device's screen.
c. **PP AAC** – (Point Prompt AAC) The child delivers a message via AAC after an adult points to the device and/or a specific symbol on the device.
d. **Elbow AAC** – The child delivers a message via AAC with an adult guiding his elbow.
e. **PPA AAC** – The child delivers a message via AAC with an adult giving partial physical assistance by guiding his wrist (with or without pointing).
f. **FPA AAC** - The child delivers a message via AAC with an adult giving full physical assistance.
g. **Nonsymbolic** – The child uses a nonsymbolic form of communication within 5 seconds of something else happening (e.g., prompt from an adult, other talking, etc.). This does not have to be related to what's going on. Examples include taking a person's hand and guiding them, reaching for objects, vocalizing, following their direction, etc. Also includes rejecting, such as intentionally responding to an adult's bid for communication within 5 seconds by walking away, pushing them away, reaching for something else, trying to escape, etc.
    - *Note!* This code includes when child reaches for or touches his AAC device in response to an adult's communication but does not activate a message.
    - Do not use this code if the child rejects something using a message on the AAC system; use an AAC code in this instance.
    - Do not use this code if the child and the adult do not have joint attention. That is, if the child is already looking away, for example, when an adult does something, do not count this as Nonsymbolic, code as None.
h. **None** – The child does not do any sort of communicative behavior within 5 seconds of the adult's strategy use.
    - If you use this code, do not code *Column 7: Adult Response*
    - Also use this code if the child follows the adult's direction for a noncommunicative behavior.
        i. For example, "Go get your backpack" should not be coded as an adult strategy use and his following that direction does not get coded.
    - This code includes playing with or chewing on the toy/object they are communicating about. (Not a communicative response, just joint attention/engagement)

If the child uses two topographies simultaneously (e.g., vocalizing while also getting assistance from the elbow to use AAC), record the AAC code in the Column 5 and indicate the second topography in the Column 6: 2nd Topography of Child's Communication.

Code the prompt that worked. For example, if the adult starts with prompting from the elbow but have to move to full physical assistance to elicit the correct response, code as FPA.

Example data sheet:

Event Time Stamp	Strategy	Prompting Fidelity Code	Child Communication Behavior	Topography of Child's Communication	2nd Topography of Child's Communication	Adult Response	Notes
X:XX	*AAC model* *OR* *Opportunity* *OR* *Prompting*	*Use rules above*	*Response with AAC*	*Ind. AAC Correct or Ind. AAC babbling or PP AAC or Elbow AAC or PPA AAC or FPA AAC*	*Choices same as previous column or Nonsymbolic*	*Use rule below*	
X:XX	*AAC model OR Opportunity OR Prompting*	*Use rules above*	*None with AAC*	*Nonsymbolic* *OR* *None*		*Use rules below if Nonsymbolic* *Do not code if None*	
X:XX			*Initiation with AAC*	*Ind. AAC Correct OR Ind. AAC babbling*	*Ind. AAC Correct OR Ind. AAC babbling*	*Use rule below*	

An Extra Adult DV (not for data purposes): The Adult's Response to Child's Communication

Identifying the adult's response to the child's communication (Column 7: Adult Response):

If the child's uses AAC or nonsymbolic communication, record how the adult responds in this column, using the following codes:

a. **AAC Model** – The adult responds by providing an AAC model, as defined above. [Then, start a new line and code this using the rules above]
b. **Opportunity** – The adult responds by creating an opportunity to communicate, as defined above (not to do another behavior – like matching items). [Then, start a new line and code this using the rules above.]
c. **Prompting** – The adult responds with a prompt directed toward AAC, as defined above (prompts for other behaviors = feedback). [Then, start new line and code this using the rules above.]
d. **Feedback** – Use this code if the adult responds in some way to the child's communication but it is not one of the above strategies. This can include feedback that is clearly related to the child's communication behavior or that is unrelated to his message. For example:
   - The adult gives nonverbal feedback, such as giving the child the item they just discussed – The child says, "Yogurt." The adult gives feedback by giving a bite of yogurt.
   - The child tries to get out of the room (reject), but the SLP says, "Look at this" to try to redirect his attention.
   - The child says, "Go, go, hit, banana, happy" with the device. The adult says, "No talking. Time to be quiet."
   - The child pushes the ball away (reject) but the paraprofessional says, "You want the ball."
   - A reaches for a toy, the adult prompts to ask for "more," but then gives a different toy.
e. **None** - The adult does not respond to the message in any way [ignores, doesn't hear, etc.]

REMEMBER: If the child's Response Topography is *None*, do not code Column 7.

Example data sheet:

Event Time Stamp	Strategy	Prompting Fidelity Code	Child Communication Behavior	Topography of Child's Communication	2nd Topography of Child's Communication	Adult Response	Notes
X:XX	*AAC model*	*Use rules above*	*Response with AAC* *OR* *Initiation with AAC*	*Any code*	*Any code*	• *AAC Model* • *Opportunity* • *Prompting* • *Feedback* • *None*	
X:XX	*AAC model Opportunity Prompting*	*Use rules above*	*None with AAC*			*Nonsymbolic =same codes None =no code*	

Appendix J

Intervention 2 – One-on-One Coaching

A. Session Guide

Preparation

☐ Add performance data from previous session to the participant's graph.

☐ Using video footage from a previous session, create a short (<1 minute) video clip of the participant and child interacting and complete this table to plan what feedback you will provide on the clip (must provide feedback on at least 2 of the strategies):

Date of Clip Used:	Times from the video (mm:ss - mm:ss)	What will you tell the participant about this clip?
	: - :	Aided AAC Modeling:
	: - :	Creating opportunities:
	: - :	Systematic Prompting:

Before Observation (~5-10 minutes)

Meet with the participant briefly and:

☐ Provide video feedback:

- ☐ Show the participant the video clip you prepared without annotations.
- ☐ Ask the participant what s/he thought about their performance of the strategies in the clip. Note comments: _____
- ☐ Show the participant the clip again with annotations.
- ☐ Using the form above, give feedback by acknowledging positive use of the strategies: _____
- ☐ Using the form above, give feedback by discussing needed changes: _____

☐ Show participant the graph of their performance with each strategy; discuss progress and goals for each.

☐ Collaborate with the participant to review each strategy and develop a plan for today's observation session:

- ☐ Specify the vocabulary and mode of the child's target communication behavior: _____ (e.g., "more" on AAC device)
- ☐ Specify one or two possible **aided AAC models**: _____
  - ☐ Remind to "touch, label, expand."
  - ☐ Ask, "How confident do you feel using this strategy?
    ☐ Not at all confident ☐ Somewhat confident ☐ Confident?"

☐ Specify the plan for **creating opportunities**: _____

- ☐ Remind to "arrange and wait."
- ☐ Ask, "How confident do you feel using this strategy?
  ☐ Not at all confident ☐ Somewhat confident ☐ Confident?"

☐ Specify one way to use the **systematic prompting procedure:** _____

- ☐ Review the flowchart of the **systematic prompting procedure**.
- ☐ Ask, "How confident do you feel using this strategy?
  ☐ Not at all confident ☐ Somewhat confident ☐ Confident?"

☐ Note any **additional comments or notes** about the pre-observation conversation:
_____

Observation (~10 minutes)

☐ Observe the participant-child interaction and write information about a few times the participant used each strategy and take notes:

Aided AAC Models	Mark **x** each time the participant uses: Notes on use:
Creating Opportunities	Mark **x** each time the participant uses: Notes on use:
Systematic Prompting	1. Strategy: -- Quality:-- Notes on quality of use:
	2. Strategy: -- Quality:-- Notes on quality of use:
	3. Strategy: -- Quality:-- Notes on quality of use:
	4. Strategy: -- Quality:-- Notes on quality of use:
	5. Strategy: -- Quality:-- Notes on quality of use:

If applicable, note feedback given during observation: _____

Feedback (~5-10 minutes after observation)

When the interaction has ended, meet briefly with the participant and:

☐ Ask the participant to reflect on the session related to the three strategies and the child's target communication behavior(s) and take notes about their reflection: _____

☐ Discuss your observation notes and share your comments/feedback on **aided AAC modeling** (see above):

- ☐ Provide supportive feedback: _____

- ☐ Provide corrective feedback: _____

☐ Discuss your observation notes and share your comments/feedback on **creating opportunities** (see above):

- ☐ Provide supportive feedback: _____
- ☐ Provide corrective feedback: _____

☐ Discuss your observation notes and share your comments/feedback on **systematic prompting procedure** (see above):

- ☐ Provide supportive feedback: _____
- ☐ Provide corrective feedback: _____

☐ Give the participant the opportunity to ask questions. Note discussion: _____

☐ Ask participant to describe how s/he is using these strategies in other routines/interactions with the child: _____

☐ Set time, date, and location for next coaching session.

B. Procedural Fidelity Checklist

Intervention 2 – Coaching: Fidelity Checklist

Participant: _____ **Coach:** _____

Coder: _____ **Session Date:** _____ **Video File:** _____

Directions: For all columns left of the dark border, mark yes or no. Count the number of yeses and mark in the total section. For all columns to the right of the dark border, check all that apply.

	Discussed at least one coachee action	Vocabulary targets for A (e.g., words to use)	Strategy Procedures			Action steps (e.g., change to materials set-up)
			Aided AAC Modeling	Creating Opportunities	M-to-L Prompting	
Joint Planning						

	Coach or coachee observed live (not recorded) strategy use	Coach silently observed for whole observation	Coach modeled at least one strategy use	Coach gave verbal feedback during observation
Observation/ Action				

	Coachee offers own thoughts on strategy use, procedures, AAC	Before observation (not during VF)	During video feedback	During post-observation conversation (not during VF)
Reflection				

	Coach gives supportive feedback (e.g., praise, example of good strategy use)	Coach gives corrective feedback (e.g., something coachee can do differently)	Within video feedback	Shows graph of data	During before-observe convo (not VF)	During post-observe convo (not VF)	During observation
Feedback							

Total fidelity score (total number of **yes**es to the left of dark boarder/5) = ____**/5 =** ____**%**

C. Coaching Activities Analysis by Participant

Participant	Nina – Mother	Elsa – SpEd	Lizzy – Para	Jane – Para
# of Coaching Sessions	8	5	5	7
Average Session Length in Min. (range)	44 (35-52)	23 (18-29)	17 (13-26)	26 (22-31)
Joint Planning – Topics discussed				
Vocabulary Targets	6/8	4/5	1/5	7/7
Aided AAC Modeling	5/8	3/5	4/5	7/7
Creating Opportunities	7/8	5/5	4/5	7/7
Most-to-Least Prompting	8/8	5/5	5/5	7/7
Action Steps	8/8	4/5	5/5	7/7
Observation/Action Activities				
Coach silently observed	2/8	2/5	2/5	0/7
Coach modeled at least one strategy	0/8	0/5	2/5	5/7
Coach gave verbal feedback during observation	6/8	3/5	2/5	6/7
Reflection – Coachee reflected during:				
Before-observation conversation	8/8	4/5	4/5	7/7
Video feedback	8/8	3/5	2/5	2/7
Post-observation conversation	8/8	5/5	3/5	6/7
Feedback – Coach offered feedback:				
Via video feedback	8/8	3/5	2/5	2/7
Via graph of performance data	3/8	1/5	0/5	0/7
Before observation	7/8	5/5	5/5	7/7
During observation	8/8	3/5	3/5	6/7
After observation	6/8	3/5	2/5	6/7
Interobserver Agreement				
Sessions observed (%)	3 (37.5)	2 (40)	2 (40)	3 (43)
Point-by-point agreement percentage	94	88	78	90

Note. For session activities, numerator indicates the number of sessions in which the activity occurred and denominator indicates the total number of coaching sessions. Interobserver agreement was calculated for the presence/absence of coaching activities. A second observer, an undergraduate student in speech and hearing science who was naïve to the study purpose or conditions, watched at least 30% of the video recording of coaching sessions for each participant and completed the same fidelity checklist (i.e., a reliability check). Point-by-point agreement calculated by counting the number of agreements, dividing that by the number of disagreements and multiplying that by 100.