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The State of Interprofessional Collaboration in the Schools for Students with Complex

Communication Needs

by

Erica LaBranch

A thesis

submitted in partial fulfillment

of the requirements for the degree of

Master of Science in the Department of Communication Sciences and Disorders

Idaho State University

Spring 2022

To the Graduate Faculty:

The members of the committee appointed to examine the thesis of Erica LaBranch find it satisfactory and recommend that it be accepted.

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RE: Study Number IRB-FY2021-223: The State of Interprofessional Collaboration in the
Schools for Students with Complex Communication Needs

Dear Dr. Brock:

I agree that this study qualifies as exempt from review under the following guideline: Category
2.(i). Research that only includes interactions involving educational tests (cognitive, diagnostic,
aptitude, achievement), survey procedures, interview procedures, or observation of public
behavior (including visual or auditory recording).
The information obtained is recorded by the investigator in such a manner that the identity of the
human subjects cannot readily be ascertained, directly or through identifiers linked to the
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This letter is your approval, please, keep this document in a safe place.

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Tom Bailey (208-282-2179; fax 208-282-4723; email: humsubj@isu.edu) if you have any
questions or require further information.

Sincerely,

Ralph Baergen, PhD, MPH, CIP
Human Subjects Chair

Acknowledgements

An immense gratitude to:

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The State of Interprofessional Collaboration in the Schools for Students with Complex

Communication Needs

Thesis Abstract – Idaho State University (2022)

Research into team-based services in the schools for students with complex

communication needs (CCN) shows uneven implementation of best practice principles for team-

based intervention. A convenience sample of 62 school-based SLPs was surveyed about their

collaborative experiences in the school setting, with questions specific to (a) the number of

collaborators and from which professions they came; (b) the frequency at which SLPs speak with

their collaborators, and (c) the tools SLPs and their collaborators use to communicate and

organize. Results from descriptive statistics, correlations, and binomial logistic regressions

revealed the following: SLPs have an average of 6.46 collaborators; SLPs with larger AAC

caseloads have fewer collaborators; SLPs collaborate most frequently with special education

teachers, paraprofessionals, and occupational therapists; SLPs are more satisfied with

collaboration when they have fewer collaborators; caseload size was not predictive of how

frequently SLPs spoke with any collaborator. This study adds to the sizeable body of existing

research on barriers to effective clinical practice for AAC in the schools, as well as provides

additional support for use of a workload model in the schools.

Key Words: augmentative and alternative communication (AAC), interprofessional

collaboration, school-based services

Introduction

Augmentative and alternative communication (AAC) has been defined as an area of practice that "compensate[s] for temporary or permanent impairments, activity limitations, and participation restrictions" (American Speech-Language-Hearing Association, 2005, para. 1) by incorporating "tools and strategies [such as "symbols, pictures, and speech-generating devices"] that an individual uses to solve every day communicative challenges" (International Society for Augmentative and Alternative Communication, n.d., para. 1). Consideration of the tools and strategies that best enhance the life participation of an individual with complex communication needs (CCN) is informed by the cognitive, linguistic, sensory, and physical-motoric skills of the individual, as well as the demands of their social environment (Beukelman & Mirenda, 2013). As most professionals understand, it is not within the speech-language pathologist's (SLP) scope of clinical practice to assess and treat within all of these areas. Therefore, an interdisciplinary approach is required (Beukelman & Mirenda, 2013).

Team-based, family-centered services are mandated by the Individuals with Disabilities Education Act (IDEA, 2004) and team collaboration has long been acknowledged as best practice for AAC intervention (Beukelman & Mirenda, 2013; Binger et al., 2012). Families with strong intervention teams reported that effective team collaboration fostered positive feelings about AAC intervention and contributed to the success of their child's intervention plan (Bailey, Parette, et al., 2006). Moreover, professionals of all experience levels who participated in regular interdisciplinary AAC meetings reported positive feelings about the collaborative process, attributing growth in their clinical skill directly to interprofessional collaboration (Batorowicz & Shepherd, 2011).

Despite the well-documented impact of successful team collaboration on AAC

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intervention outcomes, interviews and surveys of both SLPs and parents across the last two decades have found that low-quality or absent team collaboration is consistently mentioned as a factor limiting the success of AAC intervention (Anderson et al., 2014; Bailey, Parette, et al., 2006, Chung & Stoner, 2016, Moorcroft et al., 2020). In a recent survey asking licensed SLPs about business-as-usual practices, 85% (202/237) of SLPs reported spending less than two hours collaborating with other stakeholders in preparation for an AAC evaluation (Cummings et al., 2021). More concerning is the fact that 51% of those SLPs spent less than sixty minutes collaborating. Only a limited understanding of school-based SLPs' collaborative efforts for students with complex communication needs can be gleaned from the existing literature. Therefore, additional information on the collaborative practices of SLPs is required to definitively ascertain whether low-quality and infrequent collaborative efforts are more the norm than the exception. The purpose of this study, then, is to survey SLPs working in the schools about their collaborative practices to determine how widespread the research-to-practice gap remains.

Frameworks for Coordination of AAC Team Member Responsibilities

A considerable body of research has identified opportunity and access barriers that impede the closure of the research-to-practice gap when it comes to team collaboration (e.g., Chung & Stoner, 2016; Johnston et al., 2020). These studies have focused on how these barriers shape expectations and realities of collaboration from the perspectives of a variety of stakeholders (Chung & Stoner, 2016; Soto et al., 2001). In terms of stakeholder perspectives, positive feelings about AAC collaboration were found in teams with more open communication, whose shared value of collaboration and AAC led to a clear understanding of team member responsibilities (Bailey, Stoner, et al., 2006; Batorowicz & Shepherd, 2011; Chung & Stoner,

2016; Donato et al., 2018; Lund & Light, 2007). Many stakeholders with negative teaming experiences felt that roles and responsibilities within the team were not clearly outlined (Anderson et al. 2014, Moorcroft et al., 2020; Morrow et al., 2016). The lack of clearly defined roles was associated with more negative outcomes, including device abandonment (Binger et al., 2012).

In light of these findings, various frameworks intended to improve coordination of roles and responsibilities have been proposed. The AAC Personnel Assessment Framework (Binger et al., 2012) labeled and defined various team member roles and established a structure that supports the use of multidisciplinary evidence-based practice in AAC assessment. Chung & Stoner's (2016) logic model for supporting students who use AAC provided a holistic framework to consider whether the components of a given child's intervention plan are effective in achieving desired outcomes. There is some support for the relevance and utility of the logic model in the school setting (Andzik, Chung, et al., 2019). Various types of charts for assigning and tracking team member responsibilities have been proposed and utilized with some success (Hunt et al., 2002; Zangari, 2012). There is little data on whether these or other similar frameworks have been applied by school districts on a nation-wide scale. Perhaps processes other than these frameworks are in place in schools across the United States, but there is a lack of data on that too. It is known, however, that challenges to collaboration continue to exist within the schools in the face of these suggested frameworks (Andzik, Chung, et al., 2019; Andzik, Schaefer, et al., 2019).

Team Member Perspectives by Stakeholder

In many previous studies, the term *collaboration* was used in a broad sense, without elaboration as to the specific activities implied by that term (Chung & Stoner, 2016). This soft

definition of *collaboration* may be inescapable, as the potential for standardization of AAC

services at the national, state, or even district level has remained limited due to variations among

schools in personnel, funding, access to equipment, and geographic location (Binger et al.,

2012). A soft definition of collaboration permits for those variations. However, reform of AAC

services on an administrative or legislative level requires advocates to have a big-picture

understanding of the existing disparities. The most basic definition of collaboration is the

engagement of two or more parties into a relationship of which the primary purpose is to achieve

a common goal (Junyk, 2022). In educational settings, shared decision making, pooling of

resources, and operation from a shared set of values are factors employed to achieve that shared

end goal (King-Seras et al., 2015). With respect to SLP service provision, effective collaboration

would yield a change in behavior on the part of either stakeholder that improves the quality of

the student's intervention, and/or improves the student's outcomes in a measurable way. An

example of a change in behavior on the part of a stakeholder might be improved fidelity in

implementing communication partner strategies to support learning across school environments,

when use of such strategies was inconsistent prior to the start of the collaborative relationship.

Information on the activities of individual teams can be found in some case studies

(Stoner et al., 2010), single-case experiments (Snodgrass & Meaden, 2018), small group studies

(Hunt et al., 2002) and interviews (Bailey, Stoner, et al., 2006; Lund & Light, 2007). Due to the

heterogeneous nature of AAC teams across the United States, it is impossible to extrapolate

those findings to speak for the state of collaboration in this country as a whole. However, these

existing studies provide valuable insight into the effect team member perspectives have upon

day-to-day operations, and vice-versa. Therefore, a summary of several stakeholder perspectives

on teaming is beneficial. It is also important to note that AAC teaming in the context of this

study did not include caregivers. While caregivers are an integral part of successful AAC implementation, this study focused solely on how the school professionals collaborate with one another.

Special Education Teachers

Special education teachers serve many crucial roles within the AAC team: "AAC finders" that refer students for assessment (Binger et al., 2012), AAC facilitators, communication partners, and occasionally case manager (Andzik, Chung, et al., 2019). Teachers themselves reported being cognizant of the power of their role in communication instruction, and they maintained a high level of investment in their students' communication outcomes (Andzik, Chung, et al., 2019).

In a recent interview of special education teachers who worked with students learning AAC, half of teachers (7/14) reported that their ability to collaborate with SLPs during assessment was hampered; this was either due to lack of access to an SLP at their school site(s) or perceived SLP "ineffectiveness" (Andzik, Chung, et al., 2019, p. 93). For some teachers in this situation, their feelings of frustration drove them to push forward in choosing a system so that their students did not miss out on the opportunity to use AAC, which weakened the integrity of a team approach. For example, two teachers reported wanting to "bypass" the SLP to obtain a device for their students (Andzik, Chung, et al., 2019, p. 93). Such actions not only undermine the principle of clear, open communication on which strong teams are built, they also blur the lines between scopes of practice. These findings beg the question of what investment their school sites made in the implementation of team-based practice.

Challenges to teaming continued into the intervention phase. Specifically, teachers reported few consistent, mutually available time blocks for collaboration as a barrier to team

coordination (Andzik, Chung, et al., 2019; Chung & Stoner, 2016; Kramlich, 2012). Special education teachers also reported that differing perspectives of other stakeholders with regard to roles and responsibilities influenced the level of support those stakeholders provided to the student using AAC throughout the school day (Andzik, Chung, et al., 2019). For example, one special education teacher reported limited cooperation from general education teachers in incorporating a student using AAC during inclusion time (Andzik, Chung, et al., 2019).

Paraprofessionals and Support Staff

Paraprofessionals and other support staff (e.g., teaching assistants) have a higher proportion of face-to-face time with the student as compared to many other professionals on an AAC team (Soto et al, 2001). Because of that, they serve important roles as AAC facilitators and communication partners (Binger et al., 2012).

Paraprofessionals reported that their decision to embed AAC goals into activities is made on a moment-by-moment basis, and is dependent on the size of their workload (Morrow et al., 2016; Rombouts et al., 2017). The decision is usually made with economy of time in mind (Morrow et al., 2016; Rombouts et al., 2017). Being responsible for one or more students who required substantial support for basic needs, such as toileting and feeding, was reported as one such factor limiting time to embed AAC goals (Andzik, Chung, et al., 2019). This self-prioritization of tasks often contrasts with the expectations of the SLP (Rombouts et al., 2017) and special education teacher (Andzik, Chung, et al., 2019). Paraprofessionals have also reported desires for more AAC training, as well as for more involvement during collaborative meetings so that they have the chance to provide their perspective to the team (Morrow et al., 2016; Soto et al., 2001).

Other Professions

Previous literature focused on AAC team member perspectives in the school setting is primarily focused on parents and caregivers (Anderson et al., 2014; Bailey, Parette, et al., 2006; Moorcroft et al., 2020), SLPs, special education teachers, general education teachers, and paraprofessionals (Bailey, Stoner, et al., 2006; Johnson et al., 2006; Kramlich, 2012; Moorcroft et al., 2019; Morrow et al., 2016; Soto et al., 2001). Therefore, there is little in-depth knowledge regarding the perspectives of physical therapists, occupational therapists, and other professionals that may be involved with a school-based AAC team. One fact of note is that approximately 80% of SLPs recently surveyed reported that they "seldom" or "never" co-treated with a physical therapist, assistive technologist, or AAC specialist (Cummings et al., 2021). Other forms of collaboration may be occurring, but there is little recent research outlining what steps SLPs take to coordinate with those professionals.

Speech-Language Pathologists

SLPs tended to be present throughout all stages of assessment and intervention (Binger et al., 2012). In addition to providing direct instruction to the student, SLPs wear many hats on the AAC team: (a) they provide indirect services to families and professionals (Chung & Stoner, 2016; Tegler et al., 2018); (b) they refer, help secure funding, and troubleshoot devices (Binger et al., 2012); and (c) they help the family navigate barriers and facilitators pertaining to the execution of the intervention plan (Donato et al., 2018).

SLPs have stressed the importance of AAC skill development for all professionals actively involved with the client throughout the school day, as participation of multiple stakeholders in working toward communicative competence has a crucial impact upon positive client outcomes (Chung & Stoner, 2016; Soto et al., 2001). Thus, SLPs are often responsible for

providing development opportunities, typically in areas of device management and communication partner strategies (Chung & Stoner, 2016; Tegler et al., 2018). Such training can be provided in a variety of ways, including through brief interactions in the classroom (Zangari, 2012) or longer consultation sessions (Andzik, Schaefer, et al., 2019). Parents and caregivers also felt supported when they received similar training from the SLP (Lund & Light, 2007; Moorcroft et al., 2020).

However, opportunities for stakeholder skill development are not always available. For example, Tegler et al., (2018) found that about half of SLPs interviewed (12 total) seldom or never taught communication partner strategies to other stakeholders, and one-third of SLPs did not use documents to set goals for communication partner training of other stakeholders. Andzik, Chung, et al. (2019) found that 43% (6/14) of special education teachers received "limited support" from SLPs in AAC implementation. Chung & Stoner (2016) found that when no time was allotted for such training, it was "nonexistent or haphazard" (p. 181). SLPs also acknowledged that their delivery of such training to parents in particular was associated with their own level of comfort with AAC, and some parents required much more training and support than others (Moorcroft et al., 2019). However, some AAC teams do find a way to incorporate opportunities for stakeholders to have one-on-one instruction with the SLP (Bailey, Stoner, et al., 2006). The question of whether the experiences of most teams are like the latter or the formerly described remains to be answered.

In sum, current research continues to paint a dim picture of interprofessional teaming in AAC despite the various tools developed to mitigate its difficulties. It is clear that change is needed. However, there must be an accurate understanding of what is currently occurring to guide any future efforts for large-scale reform. There is a paucity of data revealing how a large

number of teams choose to organize themselves, whether that be with any of the aforementioned frameworks or through tools of their own making. There is also a paucity of data on how SLPs working with students who use AAC systems coordinate collaborative efforts with other stakeholders. It is also not fair to extrapolate a picture of the status quo in team-based AAC services from the existing body of case studies, small group studies, and interview studies because of the heterogeneity of AAC teams across the United States.

Thus, the purpose of this study is to determine (a) how much time SLPs currently invest in collaborative activities, and (b) the methods by which they currently collaborate. Specific research questions posed included the following:

1. How frequently does collaboration occur, on average, among stakeholders during assessment and intervention for a student learning AAC in a given school year?

2. What tools do professionals use to facilitate teaming in AAC?

3. How do SLPs rate their relationships with their collaborators, during both the assessment and treatment phases of intervention? How do they rate their overall experience with collaboration for assessment and intervention at their school sites?

4. Which demographic (e.g., number of school sites served) and experiential (e.g., years of experience) variables predict strong collaborative teaming?

Methods

To obtain information about current collaborative practices, a survey was developed and distributed to SLPs working in school settings. The survey was designed following the recommendations listed in the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2004). Results are also reported in a manner consistent with CHERRIES. This research was Institutional Review Board (IRB) at Idaho State University.

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Survey Development and Items

The initial draft of the survey was developed after a review of the literature. This draft was reviewed and revised by the researcher and the thesis chair. Finally, a clinician with 20 years of AAC experience reviewed and revised the survey questions. Through the revision process, the questions were finalized to reflect three distinct categories: (a) consent and demographic questions, (b) team composition and organization, and (c) collaboration frequency with other professionals during assessment and intervention.

The survey consisted of 46 questions total: one for informed consent, two to screen out participants who did not fit inclusion criteria, eleven to obtain demographic information, and thirty-five specific to the aim of the study (i.e., collaboration). Twenty questions were multiple-choice, seven were multiple-selection, three were slider response, and five were text-entry. For the two questions that provided "other" as a choice, an associated text box was provided in which participants were asked to elaborate upon their "other" selection. Participants were given the option to skip questions in the survey if the question being asked did not align with their experiences. Survey questions were not randomized. Survey questions can be found in Table 1. Note that this table omits the question for informed consent (question #1) as well as the two questions to screen out participants according to inclusion criteria (questions #2 and #3).

Adaptive questioning was used with 22 questions and was implemented to tailor the number and complexity of questions to reflect only those collaborators and tools each participant selected at the beginning of the survey. Twenty adaptive questions asked the participant to rate the effectiveness of either a tool/communication modality or a collaborative relationship on an 11-point Likert-style scale, with a score of 1 corresponding to a rating of "not at all effective" and a score of 11 corresponding to a rating of "extremely effective". The scale was presented

with bipolar descriptors. Two adaptive questions asked the participant to select a multiple-choice

answer pertaining to how often they communicate directly with each collaborator they selected at

the beginning of the survey. The high number of adaptive questions influenced the number of

screens (pages) shown to the participant during completion of the survey. A back button was not

provided to participants to prevent confusion with regard to the high number of adaptive

questions. Therefore, participants were not able to review or revise their answers. A participant

"completeness check" was not done at the end of the survey. See Table 1 for survey questions.

Table 1

Survey Questions Included in the Analysis

Demographic Questions

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4. Please select the state in which you currently work *(drop-down select with 50 states as options)*
5. How many years' experience do you have as an SLP? *(text box response)*
6. How many years have you been an SLP at your current school site? *(text box response)*
7. Are you a direct hire to the school district, or are you a contract employee? *(direct hire, work for the district; contract with the district)*
8. How many school sites do you currently service? *(1, 2, 3, 4+)*
9. Please select the education level(s) of your current school site(s). *(preschool, elementary, middle, high)*
10. Please select the demographic description that best fits the location of your current school site(s). If you are at multiple school sites, select all that apply. *(rural, suburban, urban)*
11. Approximately how many students who use AAC do you currently have on your caseload? *(text box response)*
12. Approximately how many total students do you have on your current caseload, including AAC? *(text box response)*
13. What percentage of your students would you classify as having *mild* communication impairment? *(slider response)*
14. What percentage of your students would you classify as having *moderate* communication impairment? *(slider response)*
15. What percentage of your students would you classify as having *severe* communication impairment? *(slider response)*

Team Composition and Organization Questions

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16. Please select the teaming model that best describes the one used by your current school site(s). *(multidisciplinary, transdisciplinary, interdisciplinary, unsure, N/A)*

17. Please select **all** the stakeholder with whom you have collaborated for AAC assessment and intervention at any given time while working at your current school site(s). We will ask for more detailed information about your interaction with each of these stakeholders as the survey progresses. Please be diligent in your selections. *(paraprofessional/instructional aide, special education teacher, general education teacher, physical therapist, occupational therapist, Board Certified Behavior Analyst (BCBA), ABA technician/RBT, AAC specialist, AT specialist, AAC equipment vendor, parents and/or caregivers; I have not collaborated with any of these)*

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18. Of the stakeholders you selected, please indicate the three with whom you have collaborated most frequently for **assessment**. You may type 1 in the box next to the stakeholder with whom you collaborate most frequently, 2 in the box next to the stakeholder with whom you collaborate second-most frequently, and 3 in the box next to the stakeholder with whom you collaborate third-most frequently. If you collaborated with fewer than three of these stakeholders, you may select just one or two. *(paraprofessional/instructional aide, special education teacher, general education teacher, physical therapist, occupational therapist, Board Certified Behavior Analyst (BCBA), ABA technician/RBT, AAC specialist, AT specialist, AAC equipment vendor)*

19. Of the stakeholders you selected, please indicate the three with whom you have collaborated most frequently for **treatment**. You may type 1 in the box next to the stakeholder with whom you collaborate most frequently, 2 in the box next to the stakeholder with whom you collaborate second-most frequently, and 3 in the box next to the stakeholder with whom you collaborate third-most frequently. If you collaborated with fewer than three of these stakeholders, you may select just one or two. *(paraprofessional/instructional aide, special education teacher, general education teacher, physical therapist, occupational therapist, Board Certified Behavior Analyst (BCBA), ABA technician/RBT, AAC specialist, AT specialist, AAC equipment vendor)*

20. You indicated that you have frequently collaborated with the **paraprofessional/ instructional aide**. How effective do you consider your collaboration with the **paraprofessional/instructional aide**? Consider effectiveness as yielding a change in behavior on the part of either stakeholder that improves the quality of the student's intervention, and/or improves the student's outcomes in a measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

21. You indicated that you have frequently collaborated with the **special education teacher**. How effective do you consider your collaboration with the **special education teacher**? Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

22. You indicated that you have frequently collaborated with the **general education teacher**. How effective do you consider your collaboration with the **general education teacher?** Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

23. You indicated that you have frequently collaborated with the **physical therapist**. How effective do you consider your collaboration with the **physical therapist**? Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

24. You indicated that you have frequently collaborated with the **occupational therapist**. How effective do you consider your collaboration with the **occupational therapist**? Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

25. You indicated that you have frequently collaborated with the **school psychologist**. How effective do you consider your collaboration with the **school psychologist**? Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective*

26. You indicated that you have frequently collaborated with the **ABA technician/RBT**. How effective do you consider your collaboration with the **ABA technician/RBT**? Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

27. You indicated that you have frequently collaborated with the **Board Certified Behavior Analyst (BCBA)**. How effective do you consider your collaboration with the **Board Certified Behavior Analyst (BCBA)**? Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

28. You indicated that you have frequently collaborated with the **AAC specialist**. How effective do you consider your collaboration with the **AAC specialist**? Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

29. You indicated that you have frequently collaborated with the **AT specialist**. How effective do you consider your collaboration with the **AT specialist**? Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

30. You indicated that you have frequently collaborated with the **AAC equipment vendor**. How effective do you consider your collaboration with the **AAC equipment vendor**? Consider effectiveness as…measurable way. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

31. Overall, for **assessment**, how effective do you consider the interprofessional collaboration at your school to be for students with complex communication needs. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

32. Overall, for **treatment**, how effective do you consider the interprofessional collaboration at your school to be for students with complex communication needs. *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

Tools for Organization and Communication Questions

33. For **assessment**, please indicate the top three tools and/or methods you and your collaborators use to organize and communicate with each other. Type 1 in the box next to the tool you use most frequently, 2 in the box next to the tool you use second-most frequently, and 3 in the box next to the tool you use third-most frequently. If you use less than three of these tools, select only the ones you use. *(Google Workspace, business communication platforms [e.g., Microsoft Teams, Slack], hard copy/physical documents, phone calls, on-campus word of mouth/verbally, off campus word of mouth/verbally, emails, phone text/chat software, other [please specify in text box])*

34. For **treatment**, please indicate the top three tools and/or methods you and your collaborators use to organize and communicate with each other. Type 1 in the box next to the tool you use most frequently, 2 in the box next to the tool you use second-most frequently, and 3 in the box next to the tool you use third-most frequently. If you use less than three of these tools, select only the ones you use. *(Google Workspace, business communication platforms [e.g., Microsoft Teams, Slack], hard copy/physical documents, phone calls, on-campus word of mouth/verbally, off campus word of mouth/verbally, emails, phone text/chat software, other [please specify in text box])*

35. You selected **Google Workspace** (this includes Google Docs, Google Sheets, Google Slides, etc.) as a tool you and your collaborators use to organize and communicate with each other. How effective of a tool do you feel **Google Workspace** (this includes Google Docs, Google Sheets, Google Slides, etc.) is for your team? *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

36. You selected other **business communication platforms** (e.g., Microsoft Teams, Slack) as a tool you and your collaborators use to organize and communicate with each other. How effective of a tool do you feel the **business communication platform** you use is for your team? *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

37. You selected **hard copy/physical documents** as a tool you and your collaborators use to organize and communicate with each other. How effective of a tool do you feel **hard copy/physical documents** are for your team? *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

38. You selected **phone calls** as a method you and your collaborators use to organize and communicate with each other. How effective of a tool do you feel **phone calls** are for your team? *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

39. You selected **on campus word-of-mouth/verbally** as a method you and your collaborators use to organize and communicate with each other. How effective of a tool do you feel **on campus word-of-mouth/verbal communication** is for your team? *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

40. You selected **off-campus word of mouth/verbally** as a method you and your collaborators use to organize and communicate with each other. How effective of a tool do you feel **off-campus word of mouth/verbal communication** is for your team? *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

41. You selected **emails** as a tool you and your collaborators use to organize and communicate with each other. How effective of a tool do you feel **emails** are for your team? *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

42. You selected **phone text/chat software** as a tool you and your collaborators use to organize and communicate with each other. How effective of a tool do you feel **phone text/chat software** is for your team? *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

43. You selected **another tool or method** as a tool you and your collaborators use to organize and communicate with each other. How effective of a tool do you feel the other tool or method you use is for your team? *(11-point rating scale with bipolar descriptors: not at all effective – extremely effective)*

44. (optional) Is there anything else you would like to share about how you and other professionals at your school site(s) coordinate with the parents and caregivers for students with complex communication needs? *(text box response)*

Time Investment to Collaboration Questions

45. All the collaborators you indicated at the beginning of the survey are listed here. In the most recent school year, how frequently have you spoken with each collaborator regarding assessment and/or treatment of students who use AAC? *(for each profession shown, selecting from one of the following options: more than once per week, once per week, a few times per month, a few times per year, one to two times per year or less)*

46. In the last year, how frequently have each of your collaborators reached out to you of their own accord to discuss their role in developing communication skills of shared students who use AAC? "Reaching out" could be formally (e.g., through email) or more informally (e.g., conversations in the hallway at school). *(for each profession shown, selecting from one of the following options: more than once per week, once per week, a few times per month, a few times per year, one to two times per year or less, never)*

Rating Scale for Effectiveness

Although the generally accepted number of points for ratings scales is five to nine (Cox, 1980), there are benefits to using an 11-point Likert-style scale if it fits a study's purposes (Dawes, 2002; Leung, 2011; Preston & Coleman, 2000). An 11-point scale does not appreciably change the pattern of the results when compared the more common 5-, 6-, and 7-point scales. Specifically, data indicated no significant differences in mean scores, kurtosis, skewness, standard deviation, and reliability between 11-point, 6-point, 5-point, and 4-point scales of the same instrument (Dawes, 2002; Leung, 2011). Dawes (2002) also found the increased variance in the data offered by 11-point scales was more advantageous than 5-point scales if data were intended to be used for statistical analyses such as regression. Leung (2011) found results from the 11-point scale fell closest to a normal distribution as compared to results from 6-point, 5-point, and 4-point scale versions of the same instrument ($n > 200$ for each version). These factors were considered in creation of the scale for this study, as the original aim was to perform many statistical analyses to discover relationships between demographic and experiential variables and SLP ratings of collaboration. Although there are diminishing returns when the number of points in a scale is increased past 9 (Cox, 1980; Preston & Coleman, 2000; Bendig, 1953), use of an 11-point scale does not appear to be detrimental to results in most cases, based upon the above findings.

Recruitment Process and Survey Administration

Survey responses were collected from June 12, 2021 to December 5, 2021. The survey was an open survey (i.e., one in which any visitor to the site can access) to maximize the number of respondents (Eysenbach, 2004). A convenience sample of SLPs was recruited through outreach via social media and other organizations. Social media recruitment consisted of

advertisement of the survey in five private Facebook groups for SLPs (i.e., Speech Pathologists at Large, School-Based SLPs, AAC for the SLP, SLPs for Evidence-Based Practice, Sacramento SLPs) and one subreddit (r/slp). Additionally, the survey was distributed within four state associations for speech/language (Michigan Speech-Language Hearing Association, South Dakota Speech-Language Hearing Association, Hawaii Speech-Language Hearing Association, Montana Speech-Language Hearing Association,), two ASHA Special Interest Groups (SIG 6 - School-Age Issues and SIG 12 - Augmentative and Alternative Communication), one blog with an AAC focus (PrAACtical AAC), and one professional community of SLPs in Idaho contacted privately through email. A short explanation for the rationale of the study was provided in any emails or social media posts advertising the survey.

Study data were collected and managed using Qualtrics. Participants clicked on the link and were taken to the survey's splash page that displayed the informed consent form. Participants were told the study's purpose, estimated time for survey completion, and that this survey was voluntary. Qualtrics did not track IP addresses, email addresses, or any other identifying information about participants. Qualtrics does assign a unique response identification number to each response, but it is impossible to determine whether or not several responses were submitted by the same person due to the lack of other identifying information. Therefore, it is impossible to determine the number of unique site visitors. Because the number of unique site visitors cannot be determined, view rate and participation rate cannot be calculated (Eysenbach, 2004). Completion rate (users who submitted the last page of the survey divided by users who agreed to participate) (Eysenbach, 2012; 2004) was 74% (54/73).

Response Rates and Sample Description

School-based SLPs were recruited throughout the United States and met the following criteria: (a) ASHA-certified CCC-SLP, (b) worked in the United States, (c) worked in a school setting at least part-time, and (d) worked with at least one student that uses or is learning some form of AAC. A total of 76 SLPs accessed the survey utilizing an anonymous link. Of these, five did not meet inclusion criteria, two elected to discontinue the survey after viewing the informed consent, and seven abandoned the survey before answering any demographic questions.

The remaining 62 SLPs represented in the sample were employed in 26 states. The states with the most respondents were California (17.7% of responses) and Idaho (12.9% of responses). Further information on the number of respondents per state can be found in Table 2. With respect to work experience, 19 (30.6%) had less than five years' experience; 14 (22.6%) had 6-10 years of experience; 5 (8.1%) had 11-15 years of experience; 12 (19.4%) had 16-20 years of experience; 7 (11.3%) had 21-25 years of experience, 3 (4.8%) had 26-30 years of experience; and 2 (3.2%) had 31 or more years of experience. Most respondents (49; 79%) were direct hires to their school district of employment; the remainder (13; 21%) were on contract with the district. About half (33, 53%) of respondents worked at only one school site, with the rest (29, 47%) working at two or more schools throughout the school year. Respondents were not asked to identify if their employment was part- or full-time.

Respondents were asked to select all population areas in which they currently worked. The majority of SLPs (40, 59%) currently worked in a suburban area (an area with a population of 2500-50,000 people). Sixteen SLPs (23.9%) worked in urban areas of >50,000 people, and 11 SLPs (16.4%) worked in rural areas of <2500 people. Only five (8.0%) SLPs worked at multiple school sites across areas with differing populations.

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Detailed demographic information for all respondents who provided either full or incomplete answers to the survey can be found in Table 2.

Table 2

Participant Demographics

Baseline characteristic	n	%	Baseline characteristic	n	%
State of Residence			Number of Schools Served		
Alaska	1	1.6%	1	33	53%
Arizona	2	3.2%	2	18	29%
California	11	18%	3	3	5%
Florida	3	4.8%	4+	8	13%
Georgia	3	4.8%			
Idaho	8	13%	School(s) of Employment		
Kansas	1	1.6%	preschool	29	24%
Louisiana	3	4.8%	elementary	45	37%
Maryland	1	1.6%	middle	25	20%
Massachusetts	1	1.6%	high	23	19%
Michigan	1	1.6%			
Minnesota	2	3.2%	Population Area of Employment		
Missouri	1	1.6%	rural (< 2,500 people)	11	16%
Montana	5	8.1%	suburban (2,500-50,000 people)	40	60%
New Hampshire	1	1.6%	urban (> 50,000 people)	16	24%
New Jersey	1	1.6%			
New York	6	9.7%	Employment Status		
North Carolina	1	1.6%	direct hire to the district	49	79%
Ohio	2	3.2%	contract with the district	13	21%
Oregon	3	4.8%			
Pennsylvania	1	1.6%	Years of Experience		
Texas	1	1.6%	5 years or less	19	31%
Utah	1	1.6%	6-10 years	14	23%
Washington	1	1.6%	11-15 years	5	8%
Wisconsin	1	1.6%	16-20 years	12	19%
			21-25 years	7	11%
			26-30 years	3	5%
			31+ years	2	3%

Seventeen SLPs (27.4%) reported a total caseload size of 30 or fewer students, 19 (30.6%) had caseloads of 31-50, 18 (29%) had caseloads of 51-70, and 8 (12.8%) had caseloads

of 61 or more. A plurality of SLPs (27; 43.5%) had five or fewer students that used AAC on their

caseloads. Ten SLPs (16.1%) reported having 6-10 students using AAC on their caseloads; 7

(11.3%) had 11-15 students using AAC; 5 (8.1%) had 16-20 students using AAC, and 13

(20.9%) had 21 or more students using AAC on their caseloads. The highest number of students

using AAC on a caseload reported by an SLP was 65. The average percentage of students with

severe communication impairment using AAC on respondents' caseloads was 73.2%; the

average percentage for moderate and mild communication impairment, respectively, was 27.9%

and 9.5%.

Design

This study used a descriptive study design to (a) investigate the people and tools involved

in collaborative efforts during assessment and treatment of students with complex

communication needs in the schools, (b) discover SLPs' perceived effectiveness of collaborative

efforts at their schools for students with complex communication needs, and (c) determine the

presence and type of relationship demographic and experiential variables have to strong

collaborative teaming. Descriptive studies are used to describe the characteristics, attitudes, or

behaviors of a single population of interest with no attempt to make inferences or causal

statements (Mertler, 2017).

Data Preparation and Analysis

There were 62 respondents; 55 responses were complete and 7 were incomplete. The

other seven responses contained fewer answers, but the type and number of questions answered

was sufficient to warrant inclusion in analysis. Both partial and full responses to the survey were

included for analysis. No statistical corrections were made to adjust for potentially non-representative samples.

Survey responses were compiled and analyzed using *Qualtrics* and jamovi (2021). Descriptive statistics were conducted for all survey items to determine: (1) the number of collaborators, (2) the frequency of collaboration with other educational professionals, (3) the effectiveness of those relationships with respect to assessment and intervention teaming, (4) the demographic and experiential variables related to strong teaming, and (5) the tools used to facilitate teaming. In conjunction with descriptive analyses, several two-tailed correlations were conducted to determine relationships between the following variables: years as an SLP, overall caseload size, AAC caseload size, total number of collaborators, and assessment and treatment collaboration effectiveness ratings.

To determine which demographic and experiential variables impacted collaboration, several binomial logistic regression analyses were conducted. Logistic regression requires a reference or comparison group to be conducted. Therefore, the correlational and descriptive analyses guided the creation of the "ideal" reference group. For example, SLPs with less than six collaborative partners was considered low collaboration while anything else was considered high collaboration. In this regression, "ideal" collaboration included six or more partners because the average number of SLP collaborators was 6.46. Due to the low number of cases for some dependent variables, all regressions were run with only one predictor variable in order to comply with the recommended ratio of a minimum of 10 cases for each predictor variable (Long, 1997; Peduzzi et al., 1996). It is important to note that years of experience had no significant impacts on any variable and will not be reported in the results section.

<center>**Results**</center>

Team Composition and Caseload

The majority of SLPs indicated multiple collaborative interprofessional relationships for their students with complex communication needs for all stages of services (both assessment and treatment). The average number of collaborators was 6.46, the median number of collaborators was 6, and the mode was 5, with 19.7% (12/61) SLPs indicating five collaborators. Two out of 61 SLPs (3.2%) indicated 1-2 collaborators; 10/61 (16.4%) indicated 3-4 collaborators, 20/61 (32.8%) indicated 5-6 collaborators; 14/61 (22.9%) indicated 7-8 collaborators; 14/61 (23.0%) indicated 9-10 collaborators; and 1/61 (1.6%) indicated 11-12 collaborators. Only one SLP indicated no collaborators for their students with complex communication needs.

As previously mentioned, coordination among professionals outside of the involvement of parents and caregivers was the focus of this study. It is acknowledged that parents and caregivers as essential parts of the team in family-centered services (Beukelman & Light, 2020); therefore, the option to indicate parents and caregivers as members of the team was included in this particular question in the survey. It would be unfair to exclude parents and caregivers from this question for this reason. However, as the impact of parents and caregivers on team function was outside the scope of the research questions, no further questions pertaining to interactions with parents were presented to participants

See Table 3 for information on the number of SLPs that indicated each profession as a collaborator.

<center>25</center>

Table 3

Professions who Collaborate with SLPs

Collaborator	n	%
Special education teacher	53	87%
Parent(s) and/or caregiver(s)	52	85%
Paraprofessional/instructional aide (IA)	49	80%
Occupational therapist (OT)	46	75%
Physical therapist (PT)	24	39%
AAC specialist	22	36%
AAC equipment vendor	22	36%
Assistive Technology (AT) specialist	22	36%
School psychologist	21	34%
General education teacher	20	33%
Board Certified Behavior Analyst (BCBA)	19	31%
ABA technician/RBT	11	18%

SLPs were asked to indicate their top three collaborators separately for assessment and treatment. For assessment, special education teachers were chosen as a top three collaborator most frequently (ranked first = 25 SLPs; ranked second = 22; ranked third = 6). The next most frequently named collaborators were AAC specialists (ranked first = 11, ranked second = 5), occupational therapists (ranked second = 8, ranked third = 6), followed by paraprofessionals/ instructional aides (ranked first = 6, ranked second = 5, ranked third = 13). For treatment, special education teachers were also chosen most frequently as a top three collaborator (ranked first =

32; ranked second = 16; ranked third = 4). The next most frequently named collaborators were paraprofessionals/instructional aides (ranked first = 16, ranked second = 14, ranked third = 10), followed by occupational therapists (ranked first = 3, ranked second = 7, ranked third = 6). All other professions (general education teachers, AAC specialists, AT specialists, school psychologists, physical therapists, BCBAs, ABA technicians/RBTs, and AAC equipment vendors) were indicated as top three collaborators by ten or fewer SLPs in both assessment and treatment phases.

Approximately 34% (21/62) of SLPs work at a school using an interdisciplinary model, 48.4% (30/62) SLPs work at a school using a multidisciplinary model; 16.1% (10/62) SLPs work at a school using a transdisciplinary model, and 1.6% (1/62) SLPs were unsure of the team model used at their site. Most SLPs whose site used an interdisciplinary model (16/21; 76%) had high numbers of collaborators (defined for analysis purposes as more than six collaborators). 17/30 (56%) SLPs whose sites used a transdisciplinary model had high numbers of collaborators, and 4/10 (40%) SLPs whose sites used a transdisciplinary model had a high number of collaborators. Total number of collaborators was positively correlated with number of students on AAC caseload ($r = 0.464$; $p < 0.001$). See Table 4 for all correlations.

Collaborative Relationships and Caseload Logistic Regressions

Four binomial logistic regressions were conducted to determine the impact of demographic variables on number of collaborative partnerships. For the first regression model, the dependent variable (number of collaborators) was dichotomized so that SLPs with high collaboration included six or more partners while low collaboration included less than five partners. As stated above, dependent variables were dichotomized based upon findings from the correlational and descriptive analyses. For number of collaborators, the high/low split was based

upon the mean of that variable (6.46 collaborators). The predictor variable was AAC caseload

size. Results indicated that SLP's perception of assessment effectiveness significantly ($p = .024$)

decreased as the number of collaborative relationships increased (odds ratio = 0.772). Similarly,

as AAC caseloads increased, the number of collaborative relationships significantly ($p < .005$)

decreased (odds ratio = 0.887; See Table 5 for regressions). For the third regression model, the

predictor variable was percentage of students on AAC caseload with severe communication

impairment. Results were not statistically significant ($p = 0.138$; odds ratio =), indicating

percentage of students with severe communication impairment on SLP caseload is not predictive

of total number of collaborators.

The third binomial logistic regression was conducted to determine the impact of the

number of SLP school sites (one to four schools served) on AAC caseload size, which was

dichotomized as high (> 13 clients) or low (< 12 clients). This dichotomization was based upon

the mean AAC caseload size (13.2 clients). The results indicated that SLPs who served four

schools, in comparison to those who only served a single school, had significantly ($p = .03$)

larger AAC caseloads (odds ratio = 6.60). See Table 6 for regressions.

Table 4

Correlations for Study Variables

Tool	n	M	SD	1	2	3	4	5	6
1. Total no. of collaborators	61	6.46	2.40	-					
2. Total caseload size	62	46.9	26.90	0.069	-				
3. AAC caseload size	61	13.2	13.8	0.464§	0.211	-			
4. SLP Years' Experience	61	12.1	8.98	-0.076	-0.086	-0.144	-		
5. Assessment Effectiveness	55	6.89	2.64	0.319*	0.393‡	0.223	0.164	-	
6. Treatment Effectiveness	55	7.18	2.58	.0313*	0.201	0.206	0.206	0.824†	-

* $p < 0.05$. $^{\dagger}p < 0.01$. $^{\ddagger}p < 0.005$. $^{\S}p < 0.001$

Table 5

Regression Analysis Summary for Predicting Number of Collaborators

Predictor Variable	*Estimate*	*SE*	*Z*	*p*	*odds ratio*	*95% CI LL*	*95% CI UL*
AAC caseload size	-0.120	0.0431	-2.78	0.005	0.887	0.815	0.965
Caseload % – severe CCN	0.0151	0.0102	1.48	0.138	1.015	0.9952	1.04
Assessment effectiveness	-0.258	0.114	-2.26	0.024	0.772	0.617	0.966

Note. Estimate = maximum likelihood estimation coefficient, *SE* = standard error of measurement, *CI* = confidence interval, *LL* = lower limit, *UL* = upper limit.

Table 6

Regression Analysis Summary for Predicting AAC Caseload Size

Predictor Variable	*Estimate*	*SE*	*Z*	*p*	*odds ratio*	*95% CI LL*	*95% CI UL*
Number of school sites							
2 sites	0.0953	0.629	0.1516	0.880	1.100	0.321	3.773
3 sites	-15.7776	1385.378	-0.0114	0.991	1.41e-7	0.000	Inf
4 sites	1.8871	0.901	2.0940	0.036	6.60	1.128	38.604

Note. Estimate = maximum likelihood estimation coefficient, *SE* = standard error of measurement, *CI* = confidence interval, *LL* = lower limit, *UL* = upper limit.

Tools for Communication and Organization

Emails, on campus word of mouth, and phone calls were the most frequently indicated means of communication among SLPs and their collaborators in both assessment and treatment. The total number of SLPs that used each communication modality can be seen below in Figure 1.

Figure 1

Tools and Communication Modalities Used among Collaborators
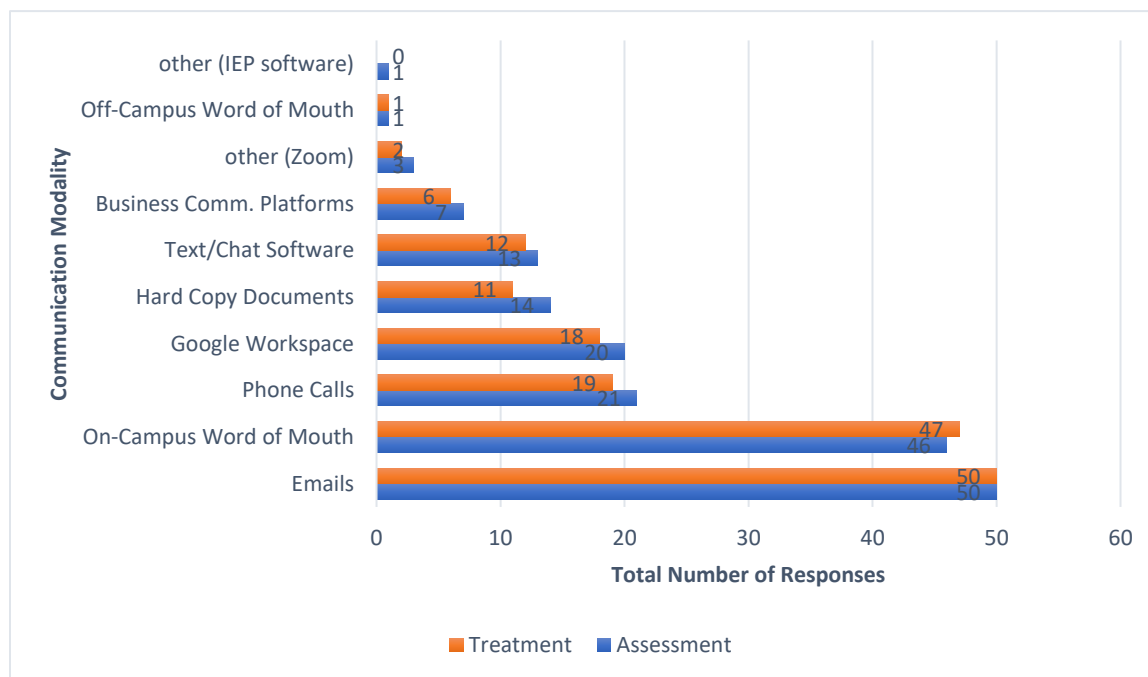
SLPs were also asked to select, in rank order of frequency of use, the top three modes of collaborative communication used with other stakeholders in the assessment and treatment phases. On-campus word of mouth was the top-ranked number-one choice (30 SLPs for assessment phase; 36 for treatment phase); the second most frequent number-one choice was emails (17 SLPs for assessment phase; 12 SLPs for treatment phase). Emails, on-campus word of

mouth, and phone calls were also second- and third-most frequent choices. Other means of communication were chosen as a top choice by six or fewer SLPs.

SLPs rated the effectiveness of their top three communication methods on an 11-point Likert-style scale, with a score of 1 corresponding to a rating of "not at all effective" and a score of 11 corresponding to a rating of "extremely effective." On-campus word of mouth was rated as the most effective method of communication, with 40/48 (83.4%) SLPs using that modality rating its effectiveness at 8 or higher (5 [10.4%] SLPs rating of 8; 9 [18.8%] SLPs rating of 9; 8 16.7%] SLPs rating of 10; 18 [37.5%] SLPs rating of 11). Other tools in order of perceived effectiveness were Google Workspace (76.2% [16/21] SLPs rated 8 or higher), phone calls (69.2% [18/24] SLPs rated 8 or higher), and emails (57.7% [30/52] SLPs rated 8 or higher). Hard copy documents was the only tool rated as ineffective, with 61.1% [11/18] of SLPs providing a rating of 7 or below. Fewer than ten SLPs provided responses for other communication tools; therefore, there are too few data points to reliably depict overall SLP satisfaction.

Overall Effectiveness of School Site Collaboration

SLPs rated the overall effectiveness of interprofessional collaboration separately for assessment and treatment. For assessment, 30/55 (54.6%) SLPs rated all collaboration at their school site at an 8 or higher. For treatment, 31/55 (56.3%) SLPs rated all collaboration at their school site at an 8 or higher. Ratings for schoolwide collaboration can be found in Figure 2.

Figure 2

Overall Effectiveness for Interprofessional Collaboration for Students with CCN in Assessment

and Treatment
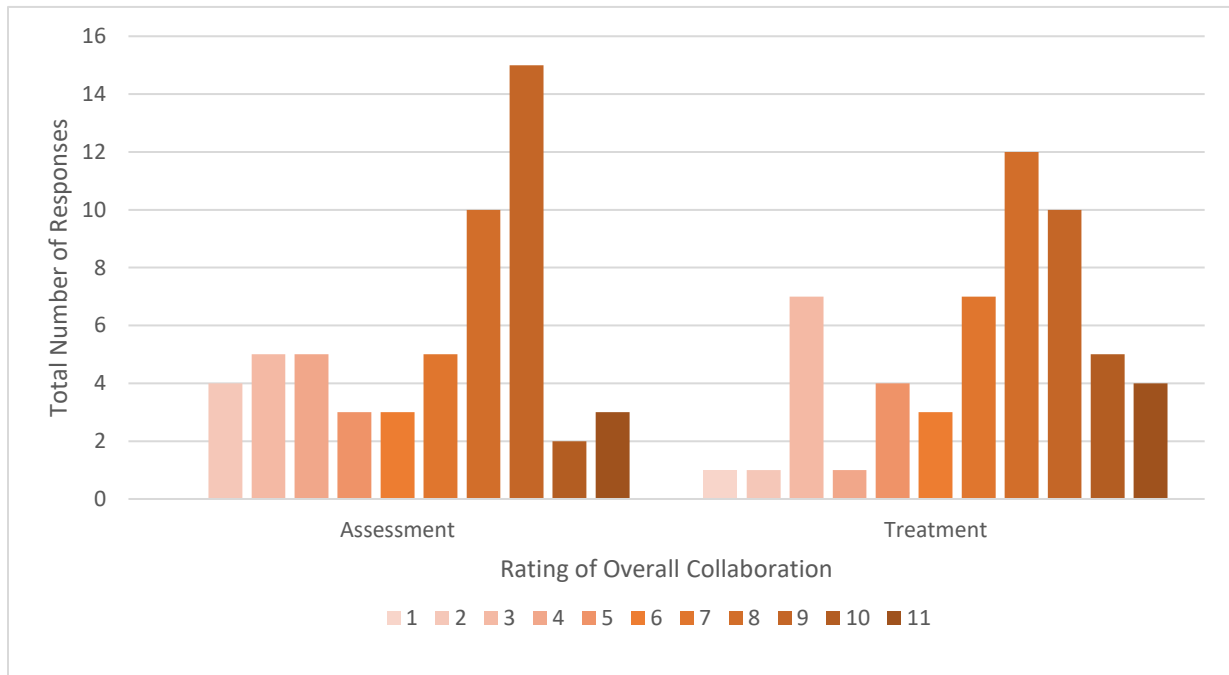
Effectiveness ratings for the assessment phase were correlated with AAC caseload size (r = 0.393; p = 0.003), but there was no correlation between treatment effectiveness ratings and caseload (r = 0.201; p = 0.140). See Table 4 for all correlations.

Logistic Regression for Assessment and Intervention Effectiveness

Eight binomial logistic regressions were performed to determine whether overall caseload size, AAC caseload size, total number of collaborators, and number of school sites served were predictive of overall effectiveness ratings in assessment or treatment. Since SLPs were asked to rate effectiveness for assessment and treatment separately, four regressions were performed with assessment effectiveness as the dependent variable, and four regressions were performed with treatment effectiveness as the dependent variable, for a total of eight regressions. For both

assessment and treatment, effective collaboration was defined as a rating of 8 or higher and ineffective collaboration was defined as a score of 7 or less. The dichotomization of this variable across this line was based upon the medians of those variables (8 for assessment, 8 for treatment). Consideration of 7 as the split for "effective" collaboration was considered as it is closer to the mean for both variables (6.89 for assessment and 7.18 for treatment); however, 7 is only one scale point away from the scale's neutral point and the degree of change in effectiveness from the neutral point would be minimal. The predictor variable for the first and second regression models was overall caseload size. The results indicated that overall caseload size was predictive of overall effectiveness ratings in the assessment phase ($p = 0.012$; odds ratio $= 0.966$), but not in the treatment phase ($p = 0.240$, odds ratio $= 0.987$).

The predictor variable for the third and fourth regression models was AAC caseload size. AAC caseload size was not predictive of overall effectiveness ratings in the assessment phase ($p = 0.549$, odds ratio $= 0.987$) or treatment phase ($p = 0.549$, odds ratio $= 0.987$). The predictor variable for the fifth and sixth and fourth regression models was total number of collaborators. Total number of collaborators was predictive of effectiveness rating in the assessment ($p = 0.02$, odds ratio $= 0.704$), but not treatment ($p = 0.059$, odds ratio $= 0.780$) phase.

The predictor variable for the seventh and eighth regression models was number of school sites served. The number of school sites served were not significantly predictive of effectiveness ratings for either the assessment or treatment phases. Results from regressions with assessment effectiveness as the dependent variable can be found in Table 7. Results from regressions with treatment effectiveness as the dependent variable can be found in Table 8.

Table 7

Regression Analysis Summary for Predicting Assessment Effectiveness

Predictor Variable	*Estimate*	*SE*	*Z*	*p*	*odds ratio*	*95% CI LL*	*95% CI UL*
Total no. of collaborators	-0.352	0.141	-2.50	0.02	0.704	0.534	0.927
Total caseload size	-0.0350	0.0139	-2.51	0.012	0.966	0.940	0.992
AAC caseload size	-0.0126	0.0210	-0.6118	0.549	0.987	0.948	1.03
Number of school sites	-0.1273	0.281	-0.4528	.651	0.880	0.507	1.53

Note. Estimate = maximum likelihood estimation coefficient, *SE* = standard error of measurement, *CI* = confidence interval, *LL* = lower limit, *UL* = upper limit.

Table 8

Regression Analysis Summary for Predicting Treatment Effectiveness

Predictor Variable	*Estimate*	*SE*	*Z*	*p*	*odds ratio*	*95% CI UL*	*95% CI LL*
Total no. of collaborators	-0.248	0.132	-1.89	0.059	0.780	0.603	1.01
Total caseload size	-0.0129	0.0110	-1.175	0.240	0.987	0.996	1.01
AAC caseload size	-0.0126	0.0210	-0.600	0.549	0.987	0.948	1.03
Number of school sites	0.00845	0.278	0.0304	0.976	1.008	0.585	1.74

Note. Estimate = maximum likelihood estimation coefficient, *SE* = standard error of measurement, *CI* = confidence interval, *LL* = lower limit, *UL* = upper limit.

Collaborator Effectiveness

SLPs rated the quality of their collaboration for each stakeholder with whom they indicated a frequent (top three) working relationship. SLPs were not asked to provide a rating on their collaboration with collaborators outside of the top three since their ratings might only be based on a small number of interactions. Quality of collaboration with each stakeholder was not rated separately for assessment and treatment phases. As stated previously, quality of collaboration was rated on an 11-point Likert-style scale, with a score of 1 corresponding to a rating of "not at all effective" and a score of 11 corresponding to a rating of "extremely effective." Complete information on collaborator ratings is found in Table 9. Fewer than ten SLPs indicated general education teachers, AT specialists, school psychologists, physical therapists, BCBAs, ABA technicians/RBTs, and AAC equipment vendors as top three collaborators. Therefore, there are too few data points to reliably analyze overall satisfaction with collaboration with those disciplines. However, their ratings from those respondents who did collaborate with those disciplines is included in Table 9.

Table 9

SLP Satisfaction with Top Three Interprofessional Collaborators

Collaborator	n	Mean	Min.	Max.	SD
Special education teacher	54	7.56	2	11	2.39
Paraprofessional/instructional aide (IA)	43	8.81	3	11	3.56
Occupational therapist (OT)	28	8.43	3	11	2.43
AAC specialist	21	8.95	3	11	2.19
General education teacher	10	5.8	2	10	2.52

Assistive Technology (AT) specialist	8	7.88	3	11	2.71
School psychologist	7	7	2	10	2.51
Physical therapist (PT)	5	5.8	1	11	3.19
Board Certified Behavior Analyst (BCBA)	5	7.4	3	11	2.73
ABA technician/RBT	4	8.5	8	10	0.87
AAC equipment vendor	2	10	9	11	1

Time Investment to Collaboration

SLPs provided information on how often both they and their collaborator(s) initiated contact with each other regarding client AAC services. SLPs were not asked to specify rates of contact separately for assessment and treatment; rather they provided an overall estimate of communication frequency for both stages of services. SLPs were asked to provide this information for all collaborators regardless of top three collaborator status.

All (52/52) SLPs who worked with the special education teacher indicated they reached out to that professional a few times per month or more to discuss clients who use AAC. A majority of SLPs reached out a few times per month or more to paraprofessionals (48/49, 98%), ABA technicians/RBTs (10/11, 91%), occupational therapists (34/45, 76%), general education teachers (12/20, 60%), BCBAs (11/19, 58%), and AAC specialists (14/27, 52%). 50% (12/24) of SLPs who worked with physical therapists reported they initiated communication with that profession a few times per month or more. The collaborators SLPs initiated communication with on the least frequent basis were AAC equipment vendors and AT specialists. For AAC equipment vendors, only 3/22 (14%) of SLPs who collaborated with that profession initiated

communication at a frequency of a few times per month or more; for AT specialists, the number is 9/22 (41%).

75% (40/53) of SLPs who worked with special education teachers reported the special education teachers initiated communication with them a few times per month or more to discuss AAC-related matters. For SLP who worked with paraprofessionals, it is 61% (30/49). All other professions were reported by SLPs to reach out to at rates below 50%. 41% (19/46) of SLPs heard from occupational therapists a few times per month or more; 41% (19/46) of SLPs heard from occupational therapists a few times per month or more; 36% (4/11) of SLPs heard from ABA technicians/RBTs a few times per month or more; 33% (9/27) of SLPs heard from AAC specialists a few times per month or more; 30% (6/20) of SLPs heard from general education teachers a few times per month or more; 19% (4/21) of SLPs heard from school psychologists a few times per month or more; 17% (4/18) of SLPs heard from AT specialists a few times per month or more; 16% (3/19) of SLPs heard from BCBAs a few times per month or more; 13% (3/24) of SLPs heard from physical therapists a few times per month or more; and 5% (1/22) of SLPs heard from AAC equipment vendors a few times per month or more.

Some professions were reported by SLPs to never reach out to them to discuss AAC-related sites regarding shared clients. The percentage of SLPs who reported physical therapists as never reaching out was highest, at 42% (10/24) For all other professions, the number of 'never' responses was the following: ABA technicians/RBTs (5/11, 45%), AAC equipment vendors (10/22, 45%), AAC specialists (7/27, 26%), AT specialists (7/22, 20%), general education teachers (6/20, 30%), school psychologists (7/21, 33%), BCBAs (4/19, 21%), occupational therapists (9/46, 20%), paraprofessionals (8/49, 16%), and special education teachers (3/53, 6%).

Table 10 shows how frequently SLPs initiate contact with a particular professional. Table 11 shows how frequently the collaborator reaches out to the SLP to discuss AAC-related matters.

Table 10

Communication from SLP to Stakeholders by Profession

Profession	n	%	Profession	n	%	Profession	n	%
Paraprofessional/IA	50	100%	Occupational Therapist	45	100%	AAC specialist	27	100%
more than once per week	30	61%	more than once per week	6	13%	more than once per week	4	15%
once per week	11	22%	once per week	9	20%	once per week	2	7%
a few times per month	7	14%	a few times per month	19	42%	a few times per month	8	30%
a few times per year	1	2%	a few times per year	6	13%	a few times per year	10	37%
1-2 times per year or less	0	0%	1-2 times per year or less	5	11%	1-2 times per year or less	3	11%
Special Education Teacher	52	100%	School Psychologist	21	100%	AT specialist	22	100%
more than once per week	32	62%	more than once per week	2	9%	more than once per week	1	5%
once per week	14	27%	once per week	2	9%	once per week	0	0%
a few times per month	6	11%	a few times per month	5	24%	a few times per month	8	36%
a few times per year	0	0%	a few times per year	6	29%	a few times per year	9	41%
1-2 times per year or less	0	0%	1-2 times per year or less	6	29%	1-2 times per year or less	4	18%
General Education Teacher	20	100%	BCBA	19	100%	AAC equipment vendor	22	100%
more than once per week	5	25%	more than once per week	1	5%	more than once per week	1	5%
once per week	1	5%	once per week	2	11%	once per week	0	0%
a few times per month	6	30%	a few times per month	5	26%	a few times per month	2	9%
a few times per year	7	35%	a few times per year	8	42%	a few times per year	9	41%
1-2 times per year or less	1	5%	1-2 times per year or less	3	16%	1-2 times per year or less	10	45%
Physical Therapist	24	100%	ABA technician/RBT	11	100%			
more than once per week	1	4%	more than once per week	2	18%			
once per week	2	8%	once per week	3	27%			
a few times per month	9	38%	a few times per month	5	46%			
a few times per year	9	38%	a few times per year	0	0%			
1-2 times per year or less	3	12%	1-2 times per year or less	1	9%			

Table 11

Communication from Stakeholders to SLP by Profession

Profession	n	%	Profession	n	%	Profession	n	%
Paraprofessional/IA	49	100%	Occupational Therapist	46	100%	AAC specialist	27	100%
more than once per week	6	12%	more than once per week	3	7%	more than once per week	3	11%
once per week	13	27%	once per week	7	15%	once per week	2	7%
a few times per month	11	22%	a few times per month	9	20%	a few times per month	4	15%
a few times per year	9	18%	a few times per year	14	30%	a few times per year	8	30%
1-2 times per year or less	2	4%	1-2 times per year or less	4	9%	1-2 times per year or less	3	11%
never	8	16%	never	9	19%	never	7	26%
Special Education Teacher	53	100%	School Psychologist	21	100%	AT specialist	22	100%
more than once per week	13	24%	more than once per week	2	9%	more than once per week	1	4%
once per week	8	15%	once per week	1	5%	once per week	0	0%
a few times per month	19	36%	a few times per month	1	5%	a few times per month	3	14%
a few times per year	5	9%	a few times per year	6	29%	a few times per year	8	36%
1-2 times per year or less	5	9%	1-2 times per year or less	4	19%	1-2 times per year or less	3	14%
never	3	6%	never	7	33%	never	7	32%
General Education Teacher	20	100%	BCBA	19	100%	AAC equipment vendor	22	100%
more than once per week	0	0%	more than once per week	0	0%	more than once per week	1	4%
once per week	2	10%	once per week	0	0%	once per week	0	0%
a few times per month	4	20%	a few times per month	3	16%	a few times per month	0	0%
a few times per year	4	20%	a few times per year	7	37%	a few times per year	7	32%
1-2 times per year or less	4	20%	1-2 times per year or less	5	26%	1-2 times per year or less	4	18%
never	6	30%	never	4	21%	never	10	46%
Physical Therapist	24	100%	ABA technician/RBT	11	100%			
more than once per week	0	0%	more than once per week	1	9%			
once per week	2	8%	once per week	1	9%			
a few times per month	1	4%	a few times per month	3	27%			
a few times per year	7	29%	a few times per year	0	0%			
1-2 times per year or less	4	17%	1-2 times per year or less	1	9%			
never	10	42%	never	5	46%			

Logistic Regression for Time Investment to Collaboration

Twenty binomial logistic regressions were conducted to determine if the frequency of reach out by the SLP to various AAC team members was predicted by AAC caseload size or total caseload size. For all regressions, the dependent variable (frequency of reach out) was dichotomized with 'frequently' as a few times per month or more and 'infrequently' as a few times per year or less. This dichotomization was based on the average number of weekly hours spent collaborating reported by SLPs in the 2020 ASHA schools survey (ASHA, 2020), which is 1.9 hours. Depending on the nature and format of the collaborative interaction, collaborative communication that occurs a few times per month could meet that average number if individual interactions were longer in duration (e.g., bimonthly staff trainings of several hours length - staff trainings were indicated as a format for collaboration by some respondents in text box comments). SLPs who speak with a collaborator a few times of per year or less will most likely always fall short of the 1.9 hours weekly average number.

Regressions with reach out to special education teacher were not conducted because 100% of SLPs spoke with them at a frequency to where they all fell into the "frequent" comparison group. For the other ten professions, neither AAC caseload size nor total caseload size was predictive of how frequently SLPs reached out to other AAC team members. See Table 12 for regression data where AAC caseload size was the predictor variable. See Table 13 for regression data where total caseload was the predictor variable.

Table 12

Regression Analysis Summary for AAC Caseload Size as Predicting SLP Reach Out Frequency

Dependent Variable	*Estimate*	*SE*	*Z*	*p*	*odds ratio*	*95% CI UL*	*95% CI LL*
1. SLP to Paraprofessional	-0.131	0.224	-0.584	0.559	0.8776	0.56626	1.36
2. SLP to Gen Ed.	-0.0259	0.0492	-0.527	0.598	0.974	0.885	1.07
3. SLP to PT	-0.0373	0.0342	-1.091	0.275	0.963	0.901	1.03
4. SLP to OT	0.0412	0.0361	-1.14	0.253	0.960	0.894	10.03
5. SLP to School Psych	0.0153	0.0293	0.524	0.600	1.02	0.959	1.08
6. SLP to ABA tech/RBT	0.0564	0.0756	0.747	0.455	1.0580	0.912	1.23
7. SLP to BCBA	0.0740	0.562	1.316	0.188	1.077	0.9644	1.20
8. SLP to AAC specialist	-0.0281	0.0290	-0.968	0.333	0.972	0.919	1.03
9. SLP to AT specialist	-0.0566	0.0399	-1.42	0.156	0.945	0.874	1.02
10. SLP to AAC eq. vend.	-0.0227	0.0383	-0.593	0.553	0.978	0.907	1.05

Note. Estimate = maximum likelihood estimation coefficient, *SE* = standard error of measurement, *CI* = confidence interval, *LL* = lower limit, *UL* = upper limit.

Table 13

Regression Analysis Summary for Total Caseload Size as Predicting Reach Out Frequency

Dependent Variable	*Estimate*	*SE*	*Z*	*p*	*odds ratio*	*95% CI UL*	*95% CI LL*
1. SLP to Paraprofessional	-0.00202	0.0410	-0.0494	0.961	0.9980	0.921	1.08
2. SLP to Gen Ed.	0.0157	0.0185	0.850	0.395	1.106	0.9797	1.05
3. SLP to PT	-0.00950	0.0145	-0.654	0.513	0.991	0.963	1.02
4. SLP to OT	-0.0391	0.0134	0.293	0.770	0.996	0.9704	1.02
5. SLP to School Psych	-0.0156	0.0161	-0.967	0.334	0.985	0.954	1.02
6. SLP to ABA tech/RBT	-0.0407	0.0515	-0.7904	0.429	0.960	0.86804	1.06
7. SLP to BCBA	0.00441	0.0201	0.219	0.826	1.00	0.966	1.04
8. SLP to AAC specialist	-0.00179	0.0131	-0.1359	0.892	0.998	0.973	1.02
9. SLP to AT specialist	0.0170	0.0198	-0.857	0.391	0.983	0.946	1.02
10. SLP to AAC eq. vend.	-0.00471	0.0267	-0.176	0.860	0.995	0.944	1.05

Note. Estimate = maximum likelihood estimation coefficient, *SE* = standard error of measurement, *CI* = confidence interval, *LL* = lower limit, *UL* = upper limit.

Qualitative Responses to Collaboration

Eleven SLPs left comments elaborating on their experience with collaboration at their school sites. Several SLPs commented that the burden of communication falls on them. One SLP stated: "The majority of the collaboration falls on the SLP;" another stated, "I don't get a lot of communication in return from [my classrooms and parents]." The effectiveness of staff trainings emerged as a theme as well. One SLP reported a recent training in an intensive summer camp format was well-liked and effective for the paraprofessionals and special education teachers. However, 3/11 SLPs who left text box comments reported the education and formal trainings provided were either not attended or not effective in changing stakeholders' attitudes towards using the device. Another SLP reported that their school is attempting a "total revamp" of their staff education due to paraprofessionals and teachers limiting use of the AAC system to academic questions. Three SLPs left comments lamenting the limited amount of modeling by classroom staff, particularly about the number of communication functions being addressed with the AAC system. Two SLPs mentioned coordination with outpatient therapies as having influence on services, both in terms of acquisition of a device ("We also coordinate with outpatient therapies, as they generally are the ones families go through for purchase of a personal AAC device when insurance and Medicaid are involved") and in building the design of the system ("Working with private SLPs can be difficult… in my situations [the school staff] has to 'run ideas' by the private SLP before changing buttons/icons/vocabulary.").

Discussion

This study sought to identify any interactions among demographic, experiential, and workplace characteristics that contribute to high-or low-quality interprofessional collaboration in the schools for students with complex communication needs. SLPs provided ratings for the

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effectiveness of each of their collaborators, as well as for overall collaboration for assessment and treatment. SLPs also indicated the frequency at which they communicated with each collaborator throughout all stages of service provision. Results show that most SLPs work with teams of 5-6 professionals and use a variety of tools to communicate and organize. On average, SLPs rated collaboration at their school sites as effective for both assessment and treatment. SLPs rated some collaborators as more effective than others, with 5/10 professions earning an "effective" rating (8 or higher on average). Physical therapists and general education teachers were the only professionals rated ineffective as AAC collaborators (average rating of 5.8 for both). For both assessment and treatment, SLPs collaborate most frequently and communicate often with special education teachers, paraprofessionals/instructional aides, and occupational therapists.

Team Composition and Organization

Caseload Characteristics

While the mean number of clients using AAC on SLP's caseloads was 13.2, there were two outliers that artificially inflated the mean - one SLP reported a caseload of 65 students using AAC. However, the median number of AAC clients on SLP's caseloads was seven, which is in line with results from the 2020 ASHA Schools Survey (ASHA, 2020). In general, the presence of students with complex communication needs on an SLP's caseload generally results in an increase in workload (ASHA, n.d.): children with combined physical-motoric, cognitive, linguistic, and sensory impairments require more time and attentional resources from an SLP than students without such needs. It follows then that the presence of multiple students with CCN on a given SLP's caseload would cause a sharp increase in workload. The finding that the odds of having a high number (6+) of collaborators decreases by 11% for each student using AAC

added to an SLP's caseload speaks to the negative effect on team structure and size high workloads can cause. That this relationship did not exist between total caseload size and number of collaborators further supports the finding that high workloads associated with high AAC caseloads contributes to decreased development of collaborative relationships.

It is interesting to consider, given the above point, that percentage of students with severe communication disorder on AAC caseload did not predict total number of collaborators. This is especially pertinent given that SLPs reported a relatively high average percentage (73%) of students on their AAC caseload having severe communication impairment. However, it is important to consider that children with severe communication impairment vary widely in their profile of physical-motoric, cognitive, and sensory impairments. Their needs for interprofessional collaboration might be lesser if deficits in those areas are milder or nonexistent. For example, a child with autism spectrum disorder who has limited verbal speech may fall within average ranges in motor ability, and therefore collaboration might not require frequent input from a PT or OT. Alternatively, a child with cerebral palsy might have mild communication impairment but significant physical-motoric deficits that require a great deal of collaboration during service provision.

SLPs who served four schools were more likely to have remarkably higher AAC caseloads than their counterparts at three or fewer schools (6.6 times more likely). It is important to note this finding could be the result of sampling bias. This survey was distributed to some groups that likely contain a higher percentage of SLPs who work in a consultative or AAC expert type of role: a professional community of SLPs in Idaho who work often with AAC, and a Facebook group focused specifically on SLPs interested in AAC intervention. Persons who fall into such a role may travel to many schools in their district to assist other professionals with

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students using AAC, and in fact may be the AAC specialist for their district. In any case, the workload demand of traveling to and from four or more schools, coupled with multiple students with CCN on one's caseload, multiplies the workload immensely. Since 79% of schools use a caseload model rather than a workload model (ASHA, 2020), it is likely that most SLPs are affected by the imbalances in workload these factors can cause. If total caseload numbers are low, those effects may not be felt as deeply. Half of respondents to this survey (36/62, 50%) reported caseload sizes lower than the national average of 47 students (ASHA, 2020).

Team Model

Team model of school site (multidisciplinary, interdisciplinary, transdisciplinary) did not appear to have significant bearing on team effectiveness ratings in either assessment or treatment. The advantage of using a team model is to formalize and thus streamline operations related to the shared decision making, pooling of resources, and operation from a shared set of values necessary for team success. Each of the three team models has its own strengths and weaknesses, and falls at different points on the continuum of interprofessional integration and holism (Choi et al., 2006). The nuances among these different teaming models are often misunderstood; however, participants were provided the definition of each team model in the survey question to ensure they selected the correct teaming model for their site. If no model emerged as better at improving the quality of collaboration, that might imply that they are equally effective, or not effective at all. Although these results are equivocal, the underlying message is that organizational changes outside of use of these team models are worth trying to improve results from teaming. Chung & Stoner (2016) recommend use of their logic model at an administrative level to improve team outcomes. Perhaps that framework could be of use with respect to this question.

Team Composition and Organization

  The trio of paraprofessional, special education teacher, and occupational therapist emerged as at the core of collaboration for most SLPs. There was limited diversity outside of those professions in the top three choices for collaborators, in both assessment and treatment. This was predictable, as special education teachers and paraprofessionals are the staff spending the most time with students throughout their school day (Soto et al, 2001) and occupational therapists are important consultants for seating, positioning, sensory, and fine motor capabilities that influence AAC system access (Beukelman & Light, 2020). The lack of diversity in top three collaborators may reflect caseload demographics for individual SLPs. For example, SLPs whose clients with CCN have diagnoses of ASD with no accompanying motor impairment may require much less input from the OT than an SLP whose AAC clients all have diagnoses of cerebral palsy. Considering the average number of collaborators was 6.46, this does not seem wholly inaccurate: SLPs are collaborating, but the mix of collaborators varies likely depends on the composition of their AAC caseload.

  The average number of collaborators indicated by SLPs (6.46) is sufficient to cover most roles in Binger et al.'s (2012) AAC Assessment Framework. Binger et al.'s framework does consider "AAC manufacturer/vendor" as a primary role; therefore, it is concerning that only 22/61 SLPs indicated AAC equipment vendors as collaborators. The importance of the vendor is emphasized when one considers that they might also fill Binger et al.'s roles of "AAC technology training agency personnel," and "AAC funding agency/funding personnel" (e.g., Tobii Dynavox is a vendor that offers assistance navigating and procuring funding [Tobii Dynavox, 2022]). However, there is a possible positive explanation for why this particular collaborative relationship might be less prominent. SLPs with more experience in AAC and/or

whose roles are more consultative may feel comfortable trialing a variety of devices and manufacturers, and end up conducting trials themselves without the need for frequent input from the AAC equipment vendor.

Tools for Communication and Organization

It was found that SLPs use multiple tools to coordinate and communicate with their collaborators. The differences in effectiveness ratings among tools speaks to the importance of using multiple tools for communication and organization. The clearest example to illustrate this point is with the two tools used by nearly all participants: emails (rated as effective by 57.7% of SLPs) and on-campus word of mouth/in-person conversations (rated as effective by 83.3% of SLPs). If these ratings were taken at face value, reliance on only emails would lead to objectively worse-quality collaboration than those collaborative efforts that relied on only in-person conversations. Emails, in particular, are problematic as a method of communication for coordinating complex or sensitive work tasks (Friedman & Currall, 2003; Maruping & Agarwal, 2004); AAC assessment and treatment could be argued to fit both of those descriptors. Frequent use of email also increases feelings of overload (Barley et al., 2011; Renaud et al., 2006). In contrast, decreases in email use can lead to development of closer relationships with colleagues and increases in ability to attend to tasks (Mark et al., 2012). The overwhelmingly high frequency of "effective" ratings for on-campus word-of-mouth makes sense when considering these factors when compared to email. Higher ratings for on-campus word of mouth/in-person conversation also are important to highlight when considering the larger picture of evidence-based communication partner techniques. Stakeholder instruction in evidence-based treatments such as aided AAC modeling requires in-person demonstration and teaching on the part of the

SLP. Without in-person communication, the ability of team members outside of the SLP to develop competency in delivering these interventions is limited.

Higher ratings for collaboration in either assessment or treatment were not associated with use of any one tool. That no one tool stood out as associated with the highest ratings for overall collaboration, and that no tools stood out as being rated highly ineffective, suggests that the modality used to collaborate is not as important as the fact that communication among stakeholders is occurring. In other words, AAC teams who collaborate effectively appear to do so regardless of the tools they use.

Overall Effectiveness of School Site Collaboration

Approximately half of SLPs indicated collaborations at their school site were effective (rating of 8 or higher). This reinforces findings from previous literature that collaboration quality in the school setting is uneven.

For every collaborative relationship, ratings for assessment effectiveness fell 30%. For every collaborative relationship, ratings for assessment effectiveness fell 22%. These data indicate that overall, SLPs feel collaboration is more effective with smaller teams. Smaller team sizes work with some existing team models proposed in the research. Chung & Stoner's (2016) logic model, specifically, was designed with flexibility of team size and composition in mind. Knowing this model can work well with the smaller teams SLPs seem to prefer underlines its utility in the school setting.

Years' experience and time at a school site did not significantly predict assessment and treatment effectiveness ratings. This suggests that more seasoned or longer-tenured SLPs are not necessarily at an advantage in AAC team collaboration. Respondents with more years' experience were more likely to maintain employment at their current school sites, and long-term

employment at the same site can lead to development of strong, long-term relationships with teachers and other staff. However, this did not necessarily translate into increases in collaboration quality. Perhaps the increase in promotion of interdisciplinary education and collaboration in the last decade from major organizations like the American Speech-Language-Hearing Association (ASHA) and associated universities is impacting the results. Fifty-fpur percent of the participants were SLPs of ten or fewer years' experience, and it is likely the graduate school experiences of these SLPs may have been affected by these recent pushes in interdisciplinary education and collaboration.

Time Investment to Collaboration

SLPs connected with each profession at varying frequencies. For some collaborations, it may be appropriate to connect with certain professionals on a more infrequent basis. AAC equipment vendors, for example, are essential partners in determining funding and type of AAC system during assessment, but they are generally not involved in weekly treatment. Communicating with an AAC equipment vendor a few times per year makes sense in that context. However, the lack of interaction between SLPs and some professional is concerning. General education teachers, in particular, are professionals a student might see on a weekly basis, even if just for a small amount of inclusion time in a general education classroom. General education teachers were listed as collaborators by only 33% of SLPs; of those SLPs, 40% speak to the general education teacher a few times per year or less about AAC assessment or intervention. The majority of SLPs collaborating with general education teachers on a frequent basis (70%, *n*=10) reported general education teachers reached out to them a few times per year or less.

In practice and in spirit, inclusion is defined as learning with peers with necessary supports in place (King-Sears et al., 2015), while also having opportunities to self-determinate within one's education (Kirby, 2017). Physical placement of a child in a general education setting without these factors does not constitute inclusion (Kirby, 2017). Students who rely on AAC that have a presence in the general education classroom might require frequent collaboration between general education teachers and SLPs to support and scaffold learning of both basic and complex communicative functions expected and required of children as curriculum demands increase (e.g., use and understanding of complex syntax; supporting reading comprehension and discussions of literature; modifying communication style for different contexts, such as giving a presentation vs. talking with peers). If SLPs and general education teachers do not collaborate across a student's educational journey, it is possible that student may not have the supports needed to develop competency in these communication skills. This could potentially have significant negative impacts on their long-term language development, further widening the gulf between their language abilities and those of their same-age peers. This is especially relevant to those students with complex communication needs placed in general education for the majority of their day.

Some findings are counter to existing research exploring frequency of collaboration from the perspectives of other stakeholders. Andzik, Chung, et al. (2019) found half (7/14) of special education teachers interviewed reported limited ability to access SLPs as a significant barrier to collaboration; however this survey found all SLP-special education teacher dyads communicate a few times a month at minimum. Some findings also support and expand upon existing research. Cummings et al.'s (2020) survey of SLPs included questions about co-treating with other disciplines (e.g., PT, AT specialist). However, this study requested SLPs report on the frequency

of interaction for any and all collaborative efforts. Presuming SLPs answered this survey while considering all formats for collaboration (co-treatments included), this paints a much dimmer picture of interaction with some disciplines and provides support for the strength of others.

Although the regressions found nothing of statistical significance, these findings do have interesting implications for real-world practice. It has been established earlier in the discussion that higher total caseload size and higher AAC caseload size together presumably equate to a higher workload. The travel time and coordination required for SLPs at multiple school sites presumably adds to workload as well. Despite those factors, the results of this study seem to imply that size of workload does not have a significant impact on how frequently SLPs communicate with other stakeholders. Previous research has suggested caseload size as a barrier to effective clinical practice for children with speech sound disorders or language disorders in many respects (Cummings, et al., 2020) as well as a limiting factor in AAC intervention (Soto et al., 2001). However, it appears this aspect of collaboration is a piece of clinical practice that is spared from the effects of high caseloads. Small sample size and response bias are also important limitations to consider when interpreting the results of these regressions.

What other workplace factors, then, need to change for SLPs to increase their frequency of collaboration? In the text box comments, multiple SLPs cited attitude and knowledge barriers (Beukelman & Mirenda, 1988) of other stakeholders as hamstringing their implementation of AAC intervention. Promotion of the value of AAC from an administrative or workplace culture level would certainly go a long way towards addressing those and other existing opportunity barriers. Perhaps restructured staff trainings, as some SLPs indicated as a current project in development in the text box comments, are the most effective avenue for affecting such workplace culture shifts. SLPs spend an average of 1.9 hours per week on interprofessional

collaboration for all clients – not just AAC clients (ASHA, 2020), and therefore, all of their collaborative attention cannot be solely focused on their clients with complex communication needs. It is also not efficient in terms of time or effort for SLPs to provide education to break down those barriers on an individual basis to each stakeholder, especially considering the average of 6.6 collaborators on the average AAC team. Help from other professionals in the school to create a larger culture shift would allow the SLP to be more specific and strategic in their collaborations for specific students. Incorporation of selected instructional coaching principles into staff trainings on AAC, such as a focus on introspection, frequent use of reflective questions, and recruitment of self-motivated staff can bring about organic, positive changes in attitudes towards and knowledge of AAC (Brown et al., 2022). SLPs might consider modifying their group staff trainings to include these components. Encouragement of the more open communication style that results in clear definition of team member roles and responsibilities (Bailey, Stoner, et al., 2006; Batorowicz & Shepherd, 2011; Chung & Stoner, 2016; Donato et al., 2018; Lund & Light, 2007) might be an additional benefit of using such training principles.

The other part of this equation, of course, is the availability of the other professional. As discussed previously, special education teachers (Andzik, Chung, et al., 2019; Chung & Stoner, 2016; Kramlich, 2012) and paraprofessionals (Morrow et al., 2016; Rombouts et al., 2017) reported time constraints as a barrier to collaboration. Other professionals may feel similarly, although there is not strong support in the research to make that assertion. There are evidence-based practices in AAC intervention that require a minimal time investment on the part of the trainee. Use of strategy instruction techniques with their collaborators are another avenue by which SLPs might increase the efficiency of their collaboration. The ImPAACT Program (Kent-Walsh & McNaaughton, 2005), specifically, requires a 2.5-4.5 hour time investment to develop

competency in delivery of evidence-based intervention strategies (e.g., aided AAC modeling) (Kent-Walsh, 2004; Binger et al., 2008; Binger et al., 2010; Kent-Walsh, Binger, & Hasham; 2010; Timpe et al., 2021). This is a benefit to busy professionals on both sides. ImPAACT also incorporates a signed, formal commitment to the program, which targets the instructional coaching principle of recruiting self-motivated staff as mentioned above. SLPs looking for an example specific to implemeting ImPAACT in a group or inservice-type format may reference Senner et al, (2016), in which four school staff were trained using the ImPAACT steps with positive results. Kent Walsh, Binger, & Malani (2010) also trialed delivery of the ImPAACT program in a group format with high (84-100%) fidelity of strategy implementation by 10/10 participants at the end of training. However that study recruited parents and caregivers as participants, not other professionals.

Training collaborators to target specific skills using strategy instruction techniques has the added benefit of them being able to pass the knowledge from their training on to other stakeholders. For example, if an SLP helps a special education teacher develop competency in intervention techniques using a strategy instruction model such as ImPAACT, that special education teacher can pass their knowledge down to the paraprofessionals working in his or her classroom. This would cut down on the time the SLP needs to spend with the paraprofessional directly (which this study showed was considerable) because they can entrust the special education teacher with the responsibility of correct implementation of the protocol. These benefits can roll over to new paraprofessionals year after year as long as the special education teacher remains confident enough in the strategies they have been taught by the SLP, and the SLP continues to collaborate with the special education teacher. Special education teachers might be a good collaborator with whom to initially try this training: the finding that they

reached out of their own accord more than the other professions implies they have a higher degree of self-motivation and buy-in with AAC.

Limitations

Several limitations warrant consideration in interpretation of the results of this study. The first limitation to consider is small sample size. A sample size of 62 participants is a relatively small and "risky" (Long, 1997) number of data points for logistic regressions, giving these analyses limited power. Small sample size also limited the possibilities for variety in univariate logistic regression analyses. For example, there were not enough responses to determine if ratings for collaboration were predictive of employment in a specific state (dichotomized as yes = in X state, no = not in X state). Results from such analyses may have shed additional light on the topics of the research questions. In addition, multivariate regression analysis (i.e., analysis with two or more predictor variables) was not possible because for many variables, cases of the dependent variable were not enough in number to continue to meet the required ratio of 10 cases of the dependent variable per predictor variable (Long, 1997; Peduzzi et al., 1996). This, too, limited the scope of analyses ran, in turn limiting the amount of insight that could have potentially been gained from the survey results. Urban and suburban SLPs were also overrepresented within the sample. Existing research has already highlighted some of the difficulties with AAC service provision rural providers face, including poorer overall quality for district AT or AAC teams and limited ability of professionals to conduct a high-quality AAC assessment (Binger et al., 2012). The possibility for further statistical exploration of the rural vs. urban divide was limited because of the small number ($n=11$) of responses from SLPs working in rural areas. One possible contributing factor to low response rate is participant fatigue. The survey had an estimated completion time of 10-15 minutes, which is on the high end of the ideal

survey length of 10 minutes (Revilla & Ochoa, 2017). Another is question format. Questions

with the 11-point rating scale were not optimized for mobile-friendly design, and this could have

caused participants completing the survey on their phones to exit prematurely. Question logic

could have also contributed to participant abandonment of the survey; however control over this

factor was attempted by the removal of a back button from the survey display.

Another limitation to consider is the exclusion of demographic and experiential questions

that may have had an impact on data analysis and interpretation. Participants were not asked if

their employment was full-time or part-time, nor were they asked to indicate the type of school

(public, private, charter, residential, etc.) at which they were employed. Knowledge of these

participant characteristics would have allowed for deeper investigation into the reasons for

certain trends in the responses. Other additional details about respondents' job responsibilities

may have benefited the analysis. For example, SLPs who indicated high AAC caseloads (40-65

students using AAC) or high total caseloads may have job roles that are balanced more heavily

towards case management, AAC consulting, and/or supervision of speech-language pathology

assistants (SLPAs). They may in fact be the AAC specialist for their district. Their experiences

with collaboration may have been appreciably different from SLPs whose roles are geared more

towards a generalist practice.

The last limitation is response bias. Social desirability bias and demand characteristics

may have played a role for some SLPs in the pattern of their responses. For example, all SLPs

reported a high degree of collaboration with the special education teacher; also, the average

rating for many collaborators was at an 8 or above. These overly sunny components to the

picture of collaboration may reflect the respondents' desires to construct a narrative that fits their

assumption of the researcher's expectations, rather than reflect their actual experiences. Due to

small sample size, there was not enough variance in the data to determine the degree to which this could be a factor.

Conclusion

This study provides a clearer picture of SLPs' experiences of AAC collaboration, to accompany findings from previous qualitative studies on AAC teaming in the schools. Overall satisfaction with collaboration was found to be split evenly between effective and ineffective, with ratings for individual collaborators varying. These findings are in line with those from previous qualitative studies.

Results provide further evidence that a workload model is beneficial for increasing collaboration in school-based services. This study provides evidence that this model would benefit school-based services for students with CCN specifically. This information may be useful to individual states and school districts in their pursuit of advocacy towards adopting a workload model. However, results also support that perhaps minor changes on the part of the SLP can increase the frequency of collaboration without heavily increasing workload. Large-scale changes, such as movement of a district from a caseload to a workload model, take time. Perhaps until those large-scale efforts are successful, SLPs might experiment with their individual and group collaborations by implementing some of the changes suggested in the discussion.

References

American Speech-Language Hearing Association. (n.d.). Caseload/Workload: Key Issues.

    Retrieved March 27, 2022, from https://www2.asha.org/PRPSpecificTopic.aspx?

    folderid=8589934681§ion=Key_Issues

American Speech-Language-Hearing Association (ASHA). (2020). ASHA 2020 Schools Survey:

    SLP Caseload and Workload Characteristics Report. Retrieved from https://www.asha.

    org/siteassets/surveys/2020-schools-survey-slp-caseload.pdf

American Speech-Language-Hearing Association (ASHA). (2005). Roles and responsibilities of

    speech-language pathologists with respect to augmentative and alternative

    communication: Position statement. Retrieved from http://www.asha.org/policy/PS2005

    00113/#sec1.1

Anderson, K., Balandin, S., & Stancliffe, R. (2014). Australian parents' experiences of speech

    generating device (SGD) service delivery. *Developmental Neurorehabilitation, 17*(2), 75-

    83. https://doi.org/10.3109/17518423.2013.857735

Andzik, N. R., Chung, Y.-C., Doneski-Nicol, J., & Dollarhide, C. T. (2019). AAC services in

    schools: A special educator's perspective. *International Journal of Developmental*

    Disabilities, 65(2), 89–97. https://doi.org/10.1080/20473869.2017.1368909

Andzik, N. R., Schaefer, J. M., Nichols, R. T., & Cannella-Malone, H. I. (2019). Exploring

    relationships between teacher training and support strategies for students utilizing

    augmentative and alternate communication. *Journal of International Special Needs*

    Education, 22(1), 25–34. https://doi.org/10.9782/16-00044

Barley, S., Myerson, D., and Grodel, S. (2011). E-mail as a source and symbol of stress.

    Organization Science 22(4), 887–906.

Batorowicz, B., & Shepherd, T. A. (2011). Teamwork in AAC: Examining clinical perceptions. *Augmentative and Alternative Communication, 27*(1), 16–25. https://doi.org/10.3109/07434618.2010.546809

Bendig, A. W. (1954). Reliability and the number of rating scale categories. *Journal of Applied Psychology, 38,* 38-40.

Beukelman, D., & Light, J. (2020). *Augmentative and alternative communication: Supporting children and adults with complex communication needs* (5th ed.). Baltimore, MD: Paul Brookes Publishing Co.

Beukelman, D., & Mirenda, P. (2013). *Augmentative and alternative communication: Supporting children and adults with complex communication needs* (4th ed.). Baltimore, MD: Paul Brookes Publishing Co.

Beukelman, D. R., & Mirenda, P. (1988). Communication options of persons who cannot speak: Assessment and evaluation. In C. A. Coston (Ed.), *Proceedings of the National Planners' Conference on Assistive Device Service Delivery* (pp. 151–165). Washington, DC: Association for the Advancement of Rehabilitation Technology.

Bailey, R.L., Parette, H.P., Stoner, J.B., Angell, M.F., & Carroll, K. (2006). Family members' perceptions of augmentative and alternative communication device use. *Language, Speech, and Hearing in Schools, 37,* 50-60.

Bailey, R.L., Stoner, J.B., Parette, H.P., & Angell, M.F. (2006) AAC team perceptions: Augmentative and alternative communication device use. *Education and Training in Developmental Disabilities, 41*(2), 139-154.

Binger, C., Ball, L., Dietz, A., Kent-Walsh, J., Lasker, J., Lund, S., McKelvey, M., & Quach, W. (2012). Personnel roles in the AAC assessment process. *Augmentative and Alternative*

Communication, 28(4), 278–288. https://doi.org/10.3109/07434618.2012.716079

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*(4), 323–338.

10.1080/07434610802130978

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(2), 108–120. 10.1044/1058-0360(2009/09-0015)

Brown, M.N., Mitchell., J., & Schnapp, M. (2022). Helping teachers to help students effectively

learn AAC. *The ASHA Leader, 27*(2), 28-29.

Choi, B.C.K., & Pak, A. W.P. (2006). Multidisciplinarity, interdisciplinarity, and

transdisciplinarity in health research, services, education, and policy: 1. Definitions,

objectives, and evidence of effectiveness. *Clin Invest Med., 29*(6), 351-364.

Chung, Y.-C., & Stoner, J. B. (2016). A meta-synthesis of team members' voices: What we need

and what we do to support students who use AAC. *Augmentative and Alternative*

Communication, 32(3), 175–186. https://doi.org/10.1080/07434618.2016.1213766

Cox, E. P. (1980). The optimal number of response alternatives for a scale: A review. *Journal of*

Marketing Research, 17, 407–422.

Cummings, A., Ogiela, D., Blaiser, K., Brock, K., & Bargen, G., (November, 2020). *Winning the*

clinical practice Tri-Wizard Cup: Creating port keys to eliminate dark magic clinical

barriers. Poster presentation at the American Speech, Language, Hearing Association

Conference, San Diego, CA.

Dawes, J. (2002). Five point vs. eleven point scales: Does it make a difference to data

    characteristics? Australasian Journal of Market Research, 10(1), 39-47.

Donato, C., Spencer, E., & Arthur-Kelly, M. (2018). A critical synthesis of barriers and

    facilitators to the use of AAC by children with autism spectrum disorder and their

    communication partners. *Augmentative and Alternative Communication, 34*(3), 242–253.

    https://doi.org/10.1080/07434618.2018.1493141

Eysenbach, G. (2014). Correction: Improving the Quality of Web Surveys: the Checklist for

    Reporting Results of Internet E-Surveys (CHERRIES). *Journal of Medical Internet*

    Research, 14(1), e8. doi:10.2196/jmir.2042

Eysenbach, G. (2004). Improving the Quality of Web Surveys: The Checklist for Reporting

    Results of Internet E-Surveys (CHERRIES). *Journal of Medical Internet Research, 6*(3),

    e34. https://doi.org/10.2196/jmir.6.3.e34

Friedman, R. A., & Currall, S. C. (2003). Conflict escalation: Dispute exacerbating elements

    of e-mail communication. Human Relations, 56, 1325-1347. doi:10.1177/

    00187267035611003

Hunt, P., Soto, G., Maier, J., Müller, E., & Goetz, L. (n.d.). Collaborative teaming to support

    students with augmentative and alternative communication needs in general

    education classrooms. *Augmentative and Alternative Communication, 18*, 20–35.

Individuals with Disabilities Education Act, 20 U.S.C. § 1400 (2004)

ISAAC – What is AAC? (n.d.). International Society for Augmentative and Alternative

    Communication. https://isaac-online.org/english/what-is-aac/

The jamovi project (2021). jamovi (Version 2.25) [Computer Software]. Retrieved from

    https://www.jamovi.org

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(2), 85–99. https://doi.org/10.1080/07434610500483588

Johnston, S. S., Blue, C., Gevarter, C., Ivy, S., & Stegenga, S. (2020). Opportunity barriers and

    promising practices for supporting individuals with complex communication needs.

    Current Developmental Disorders Reports, 7(3), 100–108. https://doi.org/10.1007/s404

    74-020-00195-w

Junyk, M. (2022). Collaboration. In *Salem Press Encyclopedia.* Salem Press.

    http://libpublic3.library.isu.edu/login?url=https://search.ebscohost.com/login.aspx?direc

    =true&db=ers&AN=100259551&site=eds-live&scope=site

Kent-Walsh, J. E. (2004). The effects of an educational assistant instructional program on the

    communicative turns of students who use augmentative and alternative communication

    during book reading activities [Pennsylvania State UniversityUMI; ProQuest]. In

    Dissertation Abstracts International, Section B: The Sciences and Engineering (Vol. 64,

    Issue 9, p. 4317).

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*(2), 97–107.

    10.1044/1058-0360(2010/09-0014)

Kent-Walsh, J., & McNaughton, D. (2005). Communication partner instruction in AAC: Present

    practices and future directions. *Augmentative and Alternative Communication, 21*, 195

    204.

King-Sears, M. E., Janney, R., Snell, M. E., Renberg, J., Hamberger, R., Ainsworth, M., Alt, L.,

Avila, K., Barry, C., Dunaway, M., Morrison, C., Scanlan, K. K., & Yovino, P. (2015). *Collaborative Teaming.* Brookes Publishing.

Kirby, M. (2017). Implicit assumptions in special education policy: Promoting full inclusion for students with learning disabilities. *Child Youth Care Forum, 46,* 175-191. 10.1007/s10566-016-9382-x

Kramlich, C. (2012). Perspectives from general education teachers, students and their parents: Including students with robust communication devices in general education classrooms. *Perspectives on Augmentative and Alternative Communication, 21*(3), 105-114. https://doi.org/10.1044/aac21.3.105

Leung, S-O. (2011). A comparison of psychometric properties and normality in 4-, 5-, 6-, and 11-point Likert scales. *Journal of Social Service Research. 37*(4), 412-421. doi:10.1080/01488376.2011.580697

Long, J.S. (1997). Regression models for categorical and limited dependent variables. *Advanced Quantitative Techniques in the Social Sciences.* Sage Publications: Thousand Oaks, CA.

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*(4), 323-335.

Mark, G.J., Voida, S., & Cardello, A.V. (2012). A pace not dictated by electrons: An empirical study of work without email. *Association for Computer Machinery.* 10.1145/2207676.2207754

Maruping, L. A., & Agarwal, R. (2004). Managing team interpersonal processes through technology: A task-technology fit perspective. *Journal of Applied Psychology, 89*, 975

990. 10.1037/0021-9010.89.6.975

Mertler, C. (2017). *Introduction to educational research.* SAGE Publications.

Moorcroft, A., Scarinci, N., & Meyer, C. (2019). Speech pathologist perspectives on the

    acceptance versus rejection or abandonment of AAC systems for children with complex

    communication needs. *Augmentative and Alternative Communication, 35*(3), 193–204.

    https://doi.org/10.1080/07434618.2019.1609577

Moorcroft, A., Scarinci, N., & Meyer, C. (2020). 'We were just kind of handed it and then it was

    smoke-bombed by everyone': How do external stakeholders contribute to parent rejection

    and the abandonment of AAC systems? *International Journal of Language &*

    Communication Disorders, 55(1), 59–69. https://doi.org/10.1111/1460-6984.12502

Morrow, D., Chen, M., & Hyppa-Martin, J. (2016). Do Students Really Need Communication

    Devices? Paraprofessionals' Perspectives on AAC and Interaction. *Conference*

    Proceedings -- International Society for Augmentative & Alternative Communication, 1-

    3

Peduzzi, P., Concato, J., Kemper, E., Holford, T. R., & Feinstein, A. R. (1996). A

    simulation study of the number of events per variable in logistic regression

    analysis. *Journal of Clinical Epidemiology, 49*(12), 1373-1379.

Preston, C. C., & Colman, A. M. (2000). Optimal number of response categories in rating scales:

    Reliability, validity, discriminating power, and respondent preferences. *Acta*

    Psychologica, 104, 1–15.

Qualtrics [Computer software]. (March 2021). Retrieved from https://www.qualtrics.com.

Renaud, K., Ramsay, J., & Hair, M. (2006). "You've got e-mail!"... shall I deal with it now?

    Electronic mail from the recipient's perspective. *International Journal of Human-*

Computer Interaction, 21(3): 313–332.

Revilla, M., & Ochoa, C. (2017). Ideal and maximum length for a web survey. *International Journal of Market Research, 59*(5), 557–565.

Rombouts, E., Maes, B., & Zink, I. (2017). The behavioural process underlying augmentative and alternative communication usage in direct support staff. *Journal of Intellectual & Developmental Disability, 42*(2), 101–113. https://doi.org/10.3109/13668250.2016.12 19023

Senner, J., & Baud, M. (2016). Pre-service training in AAC: Lessons from school staff instruction. *Perspectives of the ASHA Special Interest Groups, 1*(12), 24–31. https://doi.org/10.1044/persp1.sig12.24

Snodgrass, M. R., & Meadan, H. (2018). A boy and his AAC team: Building instructional competence across team members. *Augmentative and Alternative Communication, 34*(3), 167–179. https://doi.org/10.1080/07434618.2018.1491059

Soto, G., Müller, E., Hunt, P., & Goetz, L. (2001). Critical issues in the inclusion of students who use augmentative and alternative communication: An educational team perspective. *Augmentative and Alternative Communication, 17*, 62-72.

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*(2), 122–135. https://doi.org/10.3109/07434618.2010.48 1092

Tegler, H., Pless, M., Blom Johansson, M., & Sonnander, K. (2019). Speech and language

pathologists' perceptions and practises of communication partner training to support children's communication with high-tech speech generating devices. *Disability and Rehabilitation: Assistive Technology, 14*(6), 581–589. https://doi.org/10.1080/17483107.2018.1475515

Timpe, E.M., Kent-Walsh, J., Binger, C., Hahs-Vaughn, D., Harrington, N., & Schwartz, J.B. (2021) Using the ImPAACT program with preschoolers with Down syndrome: a hybrid service-delivery model. *Augmentative and Alternative Communication, 37*(2), 113-128. 10.1080/07434618.2021.1921025

Tobii Dynavox. (2022). *E-Funding Page Overview*. https://efunding.tobiidynavox.com/

Zangari, C. (2012). Helping the general education team support students who use AAC. *Perspectives on Augmentative and Alternative Communication, 21*(3), 82–91. https://doi.org/10.1044/aac21.3.82