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Exploring Relationships Between Teacher Training and Support Strategies for Students Utilizing Augmentative and Alternate Communication

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Abstract

Schools in the United States support a large group of students requiring the assistance of augmentative and alternate communication (AAC). It is currently unknown what types of training and supports special education teachers require or are receiving to meet the needs of these students. A convenience sample of 3,200 teachers was surveyed about the following topics: (a) number and description of students who do not have a proficient way of communicating, (b) the efforts employed by teachers to support AAC adoption, and (c) the type and length of training the teachers had specific to supporting students who need communication supports. Researchers found a statistically significant association between the amounts of training the teacher received and the communication functionality of their students. In addition, teachers with more training tend to utilize a wider variety of support strategies and certain types of training may be more effective for specific modes of communication.

Key Words: Communication; Teacher Training; AAC; Intellectual Disability

Communication is a right, yet for students with complex communication needs, fully accessing this right requires having access to appropriate technologies and the support of an educational team (Beukelman & Mirenda, 2013). In November of 2014, the Civil Rights Division of the US Department of Education released a memo reiterating the role of the school in ensuring every student has an effective way of communicating with others. Moreover, federal laws including the Individuals with Disabilities Education Improvement Act (2004), Title II of the Americans with Disabilities Act (1990), and Section 504 of the Rehabilitation Act (1973) all include language that places the obligation to ensure communication access for students with disabilities with public schools.

Two large-scale studies have looked at outcomes for students with disabilities related to communication skills. The National Longitudinal Transition Study-2 reports that only 45% of individuals with an intellectual disability, 39% of individuals with autism, and 28% of individuals with multiple disabilities communicate without any difficulty (Newman, Wagner, Cameto, Knokey, & Shaver, 2010). Conversely, the Special Education Educational Longitudinal Study (SEELS) reports that 34.4% of elementary school

children with disabilities had a lot of trouble communicating or didn't communicate at all (Wagner & Blackorby, 2002). When examining specific subsets among elementary school children with disabilities, students with Autism and Deaf-Blindness showed the highest percentages of communication (78.7% of students with autism and 81.8% of students with deaf blindness).

Augmentative and alternative communication (AAC) systems are designed to support language and communication development among students with complex communication needs (Romski & Sevcik, 2005). Aided modes of AAC utilize tools or equipment beyond the person's body including no technology (e.g., pencil and paper) to high technology (e.g., speech generating device, Johnston, Reichle, & Evans, 2004). Given disparities in income and funding for education, and more specifically special education, it is reasonable to assume that not all students with complex communication needs around the world have equal access to assistive technology and qualified specialists who are well versed in that technology. Special education laws in countries like the United States (IDEA, 2004) require that assistive technology be considered and included in the student's education plan and instruction if that technology supports the student's access to general education environments. Without such a strong legal mandate, it is less likely schools would invest the time and money into assistive technology supports. Drager, Light, and McNaughton (2010) suggest that without some AAC interventions and supports, students with complex communication needs will be at greater risk across critical phases of their growth, including functional communication skills, speech development, language development, cognitive/conceptual development, literacy development, social participation, access to education, and overall quality of life.

Conversely, explicit instruction in communication skills and AAC use has been shown to help mitigate the risks associated with complex communication needs (Romski, Sevcik, Barton-Hulsey, & Whitmore, 2015). In their review of 143 AAC related articles since the inception of the journal *Augmentative and Alternative Communication* in 1985, Romski et al. (2015) conclude that AAC is recognized as improving a range of outcomes associated with communication needs. However, Chung, Carter, and Sisco (2012) found through descriptive observation that students often relied on other methods of communication rather than utilizing their communication systems. Hence, a descriptive assessment conducted by Andzik, Chung, and Kranak (2016), found that the majority of communication events recorded across elementary students, AAC systems were not within arm's reach of the child. An example of this may have included a child with a physical disability without his device on the tray of his wheelchair. Aside from the body of literature that supports intervention for students with complex communication needs, AAC systems are not consistently available to students.

Given the effectiveness of AAC systems and the increased risk for poor long term outcomes associated with inadequate support of communication skills, practitioners—including special education teachers—need to incorporate explicit instruction on communication skills and AAC systems appropriately within the curriculum (Beukelman & Mirenda, 2013). In order to encourage students with complex communication needs to maintain and generalize use of AAC across their environments, the continued support of an educational team well trained in the use of explicit instruction and AAC is necessary (Beukelman & Mirenda, 2013).

Despite emerging literature on the efficacy of explicit instruction strategies to teach communication skills, the literature on how often and effectively team members are trained to use these strategies is limited. Looking specifically at supporting the use of assistive technology for communication, Michaels and McDermott (2003) found that a significant proportion of the special educators they surveyed felt underprepared for supporting AAC use. Sutherland, et al. (2014) found that nearly one-third ($n = 687$) of adults in the surveyed 127 living facilitates for individuals with intellectual disabilities had either no speech or used non-formal ways of communicating. The majority of the staff who support these individuals indicated their need for some training on AAC. The disconnect between the individual's use of AAC and how the support providers are prepared are likely to foster poor communication outcomes.

Currently, research indicates there is a need for more effort dedicated to preparing teachers to use support strategies used to encourage AAC. In a rare example, Van LaarhoVen and Conderman (2011) evaluated an assistive technology (AT) training component as part of a teacher preparation program. Upon the conclusion of the integration of AT training among undergraduates, participants reported being satisfied with the knowledge they gained and liked the hands-on component of the training. However, researchers did not follow these participants into classrooms to assess their ability to use AT with students with disabilities.

To this end, training practitioners to promote the use of AAC has primarily been studied in the classroom. For example, Patel and Khamis-Dakwar (2005) piloted a program aimed at providing on the job training for special education teachers working with students with complex communication needs. Upon the completion of didactic training and on-site supervision, teachers reported feeling more comfortable implementing AAC among their students with complex communication needs. There is also a limited literature base on training other team members. Bingham, Spooner, and Browder (2007) evaluated a training package

for paraprofessionals promoting the use of AAC. They found when paraprofessionals increased prompting to use AAC, the student use of AAC increased. Likewise, Lilienfeld and Alant (2005) examined the effects of a training package for peers to support AAC use among their classmates with autism. After training, they noted an increase in interactions among students using AAC and their peers.

To better understand how these educational teams can support students with complex communication needs, it is important to explore how special education teachers are trained related to AAC and what strategies they are already utilizing in their classrooms. The goal of this investigation was to explore factors affecting teachers' use of interventions and supports to promote the use of AAC among students with disabilities. We examined relationships between teacher training and supports utilized in the classroom. We also examined relationships between proficient communication among those who use AAC, teacher training, and quantity of supports.

METHOD

Survey Development

To obtain information about the training surrounding AAC and the implementation of AAC supports in the classrooms by special education teachers, a survey was developed and distributed. The survey was developed by a panel of five experts with over 40 years of combined experience in the field of moderate to profound disabilities, communication impairments, and AAC. After reviewing the literature, the first author created an initial draft of the survey that was then revised in an iterative process by the expert panel. When a revision draft was agreed upon, special education teachers, faculty, and graduate students filled out the survey to test its sensitivity, reliability, and ease of use. With feedback from the testers, the survey was again revised into its final draft (copies of the survey can be requested from the first authors). The survey included 3 questions about teachers' demographic information (i.e., years of experience, role in the classroom, state where they teach), 3 questions about contextual variables of their classrooms (i.e., grades taught, setting, amount of students needing communication support), 1 question about the amount of AAC training completed by the teacher, and 2 questions about support strategies (i.e., designed to utilize AAC in the classroom, work with the SLP) . The survey also included a six-question loop that asked for information about individual students with communication impairments whom the teacher served. The student question loop contained questions about the student's disability status, mode of communication, level of proficiency within that mode, communication-related Individualized Education Program (IEP) goals, and presence or absence of challenging behavior.

Survey Distribution and Data Collection

The survey was hosted on the online platform, Qualtrics, and a link to the survey was included in the recruitment email. When available, emails were sent directly to school principals with a request to forward a recruitment email seeking participation to the special education teachers. In all, 24 states had lists of principal's emails available publically within each state's Department of Education website. For states that did not have publically available lists of principals but did have lists of special education superintendents, those lists were used, and the email asked the superintendent to forward the recruitment email to the school's principals. A total of 21 states required a written request to obtain a list of principal's email addresses. For the five remaining states a public list or request form was not available and thus, school district websites were individually hand searched to compile a list of principals' email addresses. The university's Institutional Review Board (IRB) approved the distribution and data collection methods, however, some school districts requested the research be approved by their independent IRB. These districts were informed that individual district permission would not formally be obtained and thus they could decide to share the study with their schools if they found the university approval to be sufficient. In total 101,537 recruitment emails were sent out with requests to forward. To incentivize participation, five respondents who indicated they were interested and provided an email address, were randomly selected to receive a $100 gift card.

Sample

A total of 9,577 teachers from all 50 states responded to the survey and 3,250 responses were included in the analysis (see Table 1). For a response to be included in the analysis in this study, it had to meet the following inclusion criteria: the respondent had to (a) consent to participate and allow their answers to be reported, (b) complete the survey for a minimum of one student, (c) identify his or her role as a special education teacher (as opposed to a speech and language pathologist [SLP] or other), and (d) report at least one student who did not vocally communicate or require assistance when communicating (e.g., services from a SLP, technology, pictures, gestures). For individual student cases to be included in the analysis, the special education teacher had to report that the student used AAC when communicating. Student cases were excluded if the teacher reported that the student primarily used oral speech that could be understood by an unfamiliar listener.

Items Included in Analysis

We analyzed data related to the types of supports teachers provided to their students, the types of training teachers engaged in, and the modes of communication used by the students in their classrooms. Four types of

Table 1
Percentage of Total Respondents from Each State Surveyed

	Frequency	Percent
Alabama	68	2.1
Alaska	10	.3
Arizona	32	1.0
Arkansas	53	1.6
California	207	6.4
Colorado	28	.9
Connecticut	5	.2
Delaware	4	.1
Florida	43	1.3
Georgia	73	2.2
Hawaii	4	.1
Idaho	35	1.1
Illinois	246	7.6
Indiana	88	2.7
Iowa	110	3.4
Kansas	111	3.4
Kentucky	40	1.2
Louisiana	53	1.6
Maine	13	.4
Maryland	47	1.4
Massachusetts	4	.1
Michigan	152	4.7
Minnesota	154	4.7
Mississippi	47	1.4
Missouri	91	2.8
Montana	21	.6
Nebraska	150	4.6
Nevada	5	.2
New Hampshire	25	.8
New Jersey	50	1.5
New Mexico	65	2.0
New York	131	4.0
North Carolina	73	2.2
North Dakota	16	.5
Ohio	147	4.5
Oklahoma	80	2.5
Oregon	20	.6
Pennsylvania	32	1.0
Rhode Island	10	.3
South Carolina	47	1.4
South Dakota	20	.6
Tennessee	25	.8
Texas	196	6.0
Utah	28	.9
Vermont	12	.4
Virginia	118	3.6
Washington	67	2.1
West Virginia	29	.9
Wisconsin	147	4.5
Wyoming	18	.6

Note: n = 3250

supports teachers provide their students were examined in this analysis: consulting with a SLP, planning activities dedicated to communication, embedding communication training throughout the day, and using a combination of multiple supports. Five types of training were examined in this analysis: university training, professional development, consultation with a SLP, parent training, and self-training. For each type of training, respondents specified how much time was spent in training from five mutually exclusive options (i.e., None, 1–3 hours, 4–10 hours, 10–15 hours, 16+ hours). Although no specific description was provided to survey responders, during data analysis, researchers defined "parent training" as a parent providing communication training relevant to their child to the teacher. Four modes of communication were evaluated: natural speech, sign language, or gesture use; picture-based communication system; and use of voice output devices (VOD).

Delineation between proficient and emerging communication were devised to create a variable that could be used to measure effectiveness of intervention for children with communication impairments. Any communication effort that was not understood by an unfamiliar listener was considered to be an emerging communicator and thus at the point of this survey, we considered their communication to be emerging and needing further support or intervention. Within the natural speech mode, students who were reported as mostly understood only by a familiar listener were considering to have emerging communication. All students using natural speech as their primary mode of communication were dropped from analysis and only students primarily using AAC were included for analysis. The students using sign language or gesture and were understood by fluent sign language users were considered to have proficient communication. Students using picture-based communication were considered proficient communicators if they independently exchanged with a picture system, which had to include categories and a minimum of 30 icons to indicate all wants, needs, and comments. Finally, students proficiently communicating using VOD included those who independently activated a high-tech device including a minimum of 30 phrases, words, and spelling options.

Table 2
Types of Support Used by Teachers

	Frequency	Percent	Valid percent
Work with speech and language pathologist	439	13.5	17.0
Plan activities dedicated to communication	81	2.5	3.1
Embed communication training throughout the day	306	9.4	11.9
Work with consultant	3	.1	.1
Other support used	9	.3	.3
Multiple supports used	1712	52.7	66.4
None	28	.9	1.1
Total valid	2578	79.3	100.0
Missing	673	20.7	
Total	3251	100.0	

Data Analysis

Data were analyzed using SPSS (22.0). Due to the categorical nature of the data, likelihood-ratio chi-squared (G^2) statistics were used to test for independence among the variables. The G^2 statistic tests if two variables are related to each other by comparing the likelihood of the actual frequencies of responses to the likelihood of what we would expect due to random chance alone (Agresti, 2013). Cramer's V statistic was used to measure the strength of association between nominal variables (e.g., the relationship between a particular type of training and whether the student demonstrates proficient communication). Cramer's V ranges from 0 to 1, with 0 representing no association between the variables and 1 representing complete association between the variables. Spearman's ρ (rho) was used to measure the strength of association between ordinal variables (e.g., the relationship between the amount of training and the number of support strategies used). Spearman's ρ ranges from -1 to 1, with -1 representing perfect negative association and 1 representing perfect positive association.

RESULTS

The number of students reportedly served by teachers ranged from 1–80 ($M = 4$). Although some teachers reported supporting more than 31 students, the maximum number of actual completed student information loops was 31. Based on the discrepancy between numbers of students reported and actual loops completed, the loop strategy definitely influenced which teachers completed the survey and had an unclear effect on the teachers that responded and quit after seeing how many loops they created. A total of 3,251 respondents met the inclusion criteria and were included in the analysis for the current study. This sample provided descriptions for 8,453 students. Within the sample meeting the inclusion criteria, the number of students served by the teachers responding ranged from 1–22 ($M = 2$).

Given the focus of this analysis was with students who use AAC as their primary mode of communication, students who primarily used natural speech were dropped from analysis. The remaining analysis was completed with students using sign or gestures, picture-based communication systems, and VOD (see Table 2). Only 13.5% of students using sign or gestures were reported as being understood by fluent sign language users, 18.7% of students using pictures independently exchanged Picture Exchange Communication System (PECS) or other picture icons, and 39.1% of students using VODs independently activated a device with 30 or more phrases.

The relationship between supports utilized in the classroom (see Table 3) and various types of teacher training were examined using Cramer's V (see Table 4). Results of the analyses indicated that there is a statistically significant association between the type and amount of teacher training and the types of supports utilized in the classroom, with the strength of associations ranging from weak to moderate (Cohen, 1988). Furthermore, there were statistically significant positive associations between the number of supports utilized and the amount of training received for each type of teacher training (see Table 5). Although the magnitude of these relationships was also considered weak to moderate, the results indicate that teachers with greater amounts of training tend to utilize more support strategies.

Among the types of teacher training, statistically significant associations with overall proficient non-vocal communication were found for university training, SLP and AAC specialist consulting, and parent training, but these associations were considered weak (see Table 6). Additionally, associations with types of teacher training were examined within each mode of communication (see Table 7). Moderate associations were found between university training and proficient non-vocal communication for all three communication modes. Proficient communication using sign language was also moderately associated with SLP and AAC specialist consulting. Proficient communication using a picture-based system was moderately associated with parental training and self-training. Finally, proficient communication using a VOD was moderately associated with SLP and AAC specialist consulting.

DISCUSSION

The present study sought to explore potential relationships between teachers' training and the supports those teachers

Table 3
Student's Primary Communication Mode

Mode	Description	*n*	%
Student uses natural speech			
	Mostly understood by a familiar listener	3907	73.2
	Only understood by familiar adult	1431	26.8
	Total	5338	63.1
Student uses sign language or gestures			
	Understood by fluent sign language user	138	13.5
	Uses gestures that are mostly understood by familiar adults	885	86.5
	Total	1023	12.1
Student uses picture based communication system			
	Independently exchanges PECS or other picture system	186	18.7
	Independently exchanges 10 or less icons	224	22.5
	Independently exchanges yes/no icons only	52	5.2
	Adult prompts the use of icons	533	53.6
	Total	995	11.8
Student uses voice output device			
	Activates a high tech device independently with 30+ phrases	284	39.1
	Activates a one-touch device when given 2-5 options at a time	95	13.1
	Independently activates a one-touch device	65	9.0
	Adult prompts student to activate one-touch device	282	38.8
	Total	726	8.6

Total *N* Valid = 8082. Missing = 371 (4.4%)
Note. Percentages of total sample are in bold

provided to students with complex communication needs who use some type of augmented communication mode. We also explored the relationships between teacher training and students' level of AAC use. Specifically, the supports teacher utilized included embedded communication (e.g., naturalistic intervention), consultation with the SLP and direct communication opportunities contrived throughout the day (e.g., including functional communication training, PECS training). Finally, we gathered information pertaining to the use of AAC among students to compare our findings to those of other national, longitudinal surveys. To that end, we developed and distributed a survey to special education teachers across the U.S. This survey resulted in 3,250 special education teachers' responses that described 8,453 students with complex communication needs. We analyzed the data using a series of statistical analyses.

When describing students with complex communication needs, the majority of the students included in the sample were not using AAC independently. The findings of this sample directly correlate to U.S. studies measuring communication access among students with disabilities (Newman, Wagner, Cameto, Knokey, & Shaver, 2010; Wagner & Blackorby, 2002). The majority of students with complex communication needs in both studies communicated with difficulty. Given the recent push from the U. S. Department of Education to ensure all students with disabilities have access to communication, it is alarming that after a decade of published work on the effects of AAC intervention, our findings were similar to these large-scale studies that both reported poor outcomes for students.

When examining the associations between the type and amount of training the teacher received and the types of

Table 4
Within Each Training Group, The Difference Between Type of Supports Given

Training type	Cramer's V	G^2 ($df = 12$)	*p*
University coursework	.097	69.30	< .001
Professional development	.099	72.68	< .001
Training by speech and language pathologist	.165	202.87	< .001
Training by AAC specialist	.133	144.26	< .001
Training by parent	.078	52.79	< .001
Self-training	.173	215.11	< .001

Table 5
Within Each Training Group, The Difference Between Training and Number of Supports Given

Training type	Spearman's ρ	G^2 ($df = 16$)	p
University coursework	.236	519.52	< .001
Professional development	.186	401.82	< .001
Training by speech and language pathologist	.340	958.32	< .001
Training by AAC specialist	.251	522.13	< .001
Training by parent	.138	310.89	< .001
Self-training	.333	982.10	< .001

supports utilized (see Table 4), we found that there were statistically significant, albeit relatively weak to moderate, associations. For each type of support, the results indicate that there is a meaningful relationship between the ways special education teachers are prepared to support students with complex communication needs and the supports reported as actually being used in the classroom setting. It is important to note that the method used to analyze these relationships do not indicate directionality and cannot indicate whether greater amounts of a particular type of training are associated with specific types of supports. Rather, the results of this study suggest that a significant relationship exists that warrants further study.

We also examined the relationship between teachers' training and the number of different supports those teachers utilized in the classroom with students with complex communication needs (see Table 5). Our results suggest that teachers with more training tend to use a greater variety of supports in the classroom. Essentially, these findings indicate that teachers with more extensive training are better prepared to utilize a wider range of tools in their classrooms.

Table 6
Within Each Training Group, the Difference in Proficiency

Training type	Cramer's V	G^2 ($df = 4$)	p
University coursework	.077	15.19	.004
Professional development	.033	2.70	.609
Training by speech and language pathologist	.066	10.61	.031
Training by AAC specialist	.075	13.11	.011
Training by parent	.076	13.84	.008
Self-training	.032	2.56	.635

Teacher training was found to be significantly associated with proficient non-vocal communication use (see Table 6 and Table 7), both overall and within each mode of communication. Once again, it is important to remember that our results only suggest that potentially meaningful associations exist, but they do not tell us about the direction of these relationships. By examining the associations within each communication mode, we were able to identify which types of training are perhaps more relevant to specific modes of communication. SLP and AAC specialist training was associated with proficient communication using sign language and VOD, but not the picture-based system. University training was significantly associated with proficient communication within all three communications modes, while professional development was not significantly related to proficient communication within any of the communication modes. This would suggest that if teachers intend to work with students that use a specific mode of non-vocal communication, perhaps they would benefit more from certain types of training. For example, teachers that intend to work primarily with students that communicate through sign language or VOD might find AAC specialist training more useful than professional development or parental training.

Limitations and Future Research

There are several limitations that should be considered. These are presented below along with suggestions of the how future research further the findings of this study and address the existing gaps in the literature.

Sample. A convenience sample was used to obtain responses, which limits our ability to generalize the findings across the entire population of special education teachers working with students with complex communication needs. These results can only be interpreted as descriptive indicators of the participants in the present study. Although teachers represented all 50 states, we cannot control for the implications of this sampling method. In addition, personal demographic data were not collected for the responding teachers or their students. Without this information, we have no way to estimate the generalizability of the findings beyond the sample, as we do not know how the demographic profile of our sample compares to the larger population of special education teachers and their students. However, given the large sample size obtained, practitioners and researchers should consider these results to likely relate to their populations. Caution should be expressed when assuming the generalizability of these findings when looking at populations around the world that do not have access to some of the high-tech communication systems the students in this population had access to.

Future research should consider collecting data using forced-choice response options and not allow for multiple responses with a "check-all-that-apply" format. With these

Table 7
Association (Cramer's V) Between Type/Amount of Training and Specific Proficient Non-vocal Communication

Training type	Sign language ($n = 925$)	Picture ($n = 887$)	VOD ($n = 675$)
University coursework	.164***	.131**	.138*
Professional development	.072	.069	.096
Training by speech and language pathologist	.115*	.093	.126*
Training by AAC specialist	.136***	.059	.130*
Training by parent	.089	.121*	.063
Self-training	.061	.112*	.106

Note. ***< .001; **< .01; *< .05. G^2 ($df = 4$)

answer limitations, researchers are open to making additional correlations without excessive missing data that may make additional statistical analysis possible. Additionally, it would prove more valuable if the survey did not allow participants to skip without responding, as in many cases it became impossible to determine if skipping the question indicated that none of the answers applied or if the respondent simply chose not to answer. Several valuable questions became less useful to the analysis because the lack of a response could not be used to reliably distinguish between subjects answering no, subjects intentionally skipping the question, and subjects that exited the survey on an earlier question. Teacher questions appearing after student looped questions were often missed when respondents dropped before completing the number of student question loops they specified.

When interpreting the results of the responses, various questions were not robust enough to support clearer results. For example, the question, "Describe how you are helping all students in your classroom communicate," lacked answers worded with commonly known language associated with evidence-based practices. Piloting the survey with more explicit choices would have proven valuable when painting a picture of the environment these students were exposed to and the practices their teachers engaged in. In addition, given that teacher training was such a central focus of this study, we would suggest future researchers ask more specific questions about the nature of the teacher training, including the use of specific evidence-based practices. The individual questions regarding training (using categorical data) were acceptable for the current analysis but there was no way of collapsing the training types into total training statements about their total or overall training. This was a result of the range of training duration options for each category (i.e., a participant may have selected 1–3 hr of parent training but 16+ hr of professional development). A few additional questions that took into account total training time within each category (instead of range options) would have made it possible to make some statistical inferences using continuous data (instead of the ordinal data that were offered). This would have provided us the opportunity to talk about directionality in more of the relationships.

Association between variables was the only analysis done with the data in this study. This limited analysis could only provide information on the strength of relationships and could not provide information about the direction of the relationships. We were able to demonstrate that the training a special education teacher received does impact the use of strategies to support students with complex communication needs. We were also able to demonstrate teacher training correlated to the student's reported level of use of AAC. However, different analysis would be necessary to examine how specifically these variables impact each other. Although it is possible that any training would directly benefit the teachers over no training at all, we should look more closely at which types of training would be the most beneficial.

Future research should include students who use natural speech as their primary communication mode. While not reportedly using AAC devices, this population of students using natural speech, who are not understood by familiar listeners, would benefit from AAC. When evaluating a sample of students who use AAC when communicating, by excluding students using natural speech, researchers may obtain skewed results towards proficient access.

Implications for Practice

These findings indicate a clear need for more support directed towards students with complex communication needs and the teachers that work with them. A collaborative relationship between the SLP, assistive technology specialist, and the teacher is a good starting point but studies indicate there is a clear need for more direct teacher training. Teacher preparation programs should take these results into consideration when developing coursework around communication access. We found the most significant relationship with the amount of supports teachers used and the amount of training (specifically university training) teachers received. With the prevalence

of autism increasing, those seeking special education licensure are more likely to work with students with various communication needs.

In addition to pre-service teacher training, in-service teachers also require additional training to be the most effective when working with students who use AAC (Patel & Khamis-Dakwar, 2005). The results of this study found no relationship between in-service professional development and communication supports in practice. This has important implications for school administrators planning professional development. The most common model of in-service professional development in the United States is a single day in-service training. Recent literature reviews (Brock et al., 2017; Fallon, Collier-Meek, Maggin, Sanetti, & Johnson, 2015) highlight the lack of efficacy of single training interventions and the evidence of efficacy of continuing training like performance feedback, Behavior Skills Training, and coaching. These types of on-going professional development strategies are much closer to the support pre-service teachers receive throughout their training programs. Therefore, we recommend that school administrators allocate more time and funding to on-going embedded professional development in the individual teacher's classroom and away from whole group, single session trainings.

Given that the majority of the efficacy research has examined training pre-service and in-service special education teachers in the field, formal training from communication specialists seems the most well researched type of training (Van LaarhoVen & Conderman, 2011). That is consistent with current best practice for teachers with a focus on devices being used by their students (Fallon, 2008). Furthermore, researchers should consider planning studies that utilize practitioners as communication interventionists while the researchers ensure proper fidelity. When researchers used practitioners to implement functional communication training, student outcomes were positive 96% of the time (Andzik, Cannella-Malone, & Sigafoos, 2016).

Conclusion

Students with complex communication needs are not always getting the support they require to ensure functional and independent communication. This responsibility is that of the educational team, including the special educator. With the prevalence of high-tech communication systems, teachers need more than self-directed and informal training tools to implement these devices with accuracy. Our results indicate that many individuals with complex communication needs are not being effectively taught how to use AAC. There is a strong literature base that has identified evidence-based practices, that when used with fidelity to systemically teach AAC, should lead to better outcomes (Douglas, Light, & McNaughton, 2013; Mrachko & Kaczmarek, 2016) Therefore, consistent with other international examinations (e.g., Sutherland et al., 2014), we conclude that the breakdown must be in training teachers to implement these practices and to implement them with the fidelity required to affect change for students with complex communication needs. With the prevalence of students without functional communication paired with the push from the Department of Education to ensure all students have access to communication, researchers need to continue to examine practitioner implemented evidence-based practice. Teacher preparation programs need to use that research to offer in-depth training and ongoing support of practitioners working with students with complex communication needs.

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