

Matching Students to Augmentative and Alternative Communication: A Single Case Study

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Abstract

The purpose of this case study was to examine if the Matching Assistive Technology to Child-Augmentative Communication Evaluation Simplified (MATCH-ACES) assessment can help a special education team select an augmentative and alternative communication (AAC) intervention for a student with special needs. Additionally, this study identified the relative contributions of other interventions that the student received to begin to understand the impact that AAC had on the student. This study was a single case study and used a pretest-posttest design. There was a relationship between using the MATCH-ACES and the student's individualized education goal improvement. Personal assistance, support from related services, and AAC device use significantly contributed to the student's goal improvement. Future research should address using the MATCH-ACES assessment tool with a larger sample of students and examine the significance of the contributions of other interventions to confirm and identify critical supports for students with special needs.

Introduction

The Individuals with Disabilities Education Improvement Act of 2004 (IDEA) directs special education teams to consider assistive technology (AT), including augmentative and alternative communication (AAC) intervention, during the drafting of every student's annual Individualized Educational Program (IEP) (U.S. Department of Education, 34 CFR 300.324(a)(2)(v), 2006). In 2011, approximately 6.4 million students ages 3-21 years received special education services under IDEA (University of New Hampshire Institute on Disability, 2014). Furthermore, the use of AT has been shown to increase a student's access to school activities and to improve a student's quality of life (Garcia, Loureiro, Gonzalez, Riveiro, & Sierra, 2011; Watson, Ito, Smith, & Anderson, 2010).

Over the past several years, there has been an increasing emphasis on the inclusion of students with special needs in the general education classroom. Approximately 80% of students with special needs spend 40% or more of their time in a general education classroom (University of New Hampshire Institute on Disability, 2014). Many of these students may not use speech functionally and may be candidates for AAC intervention.

Despite the IDEA directives and the trend toward inclusion, little evidence exists on an assessment tool that can help an educational team choose an AAC intervention for a student. Additionally, research has only just begun to explore the impact that an AAC intervention can have on a student while simultaneously considering other interventions that a student receives. This limited amount of research could preclude the use of AT by educational teams, thereby forgoing a potentially effective intervention strategy for helping a student meet his or her IEP goals.

Background

Assessment

Studies addressing AT assessment focus on the positives of using a collaborative assessment tool and how this could benefit an educational team and potentially lead to improving student outcomes. Copley and Ziviani (2004, 2007) conducted two studies that both had similar results. In a 2004 literature review, Copley and Ziviani determined that a team model is the most effective method for AT assessment and planning. They also identified that it is important to involve members of an educational team, including support by a technology consultant (Copley & Ziviani, 2004). Similar results were found in Copley and Ziviani's (2007) pilot study. This case study concluded that using a team-based AT assessment can support team members in the planning and implementation of AT for students with multiple disabilities and will thus provide more effective outcomes. While both of these studies support using team-based collaborative assessments, they both recognize that formal collaborative assessments are not readily available.

Many studies on AT assessments focus on including the AT user in the device selection process to increase the user's satisfaction with the AAC intervention, and thus his or her likelihood of continuing to use the intervention rather than abandoning it. Studies with this focus show that abandonment of assistive devices hinges directly on the input that the user has during the process of AAC intervention selection (Martin, Martin, Stumbo, & Morrill, 2011; Reimer-Reiss & Wacker, 2000). Including a student with cognitive challenges, such as autism, in the selection of an AAC intervention can be difficult simply due to the student's difficulty with communication (Francis, Balbo, & Firth, 2009). However, finding alternative ways for the student to be involved in the selection of his or her AAC intervention is important. Zapf, Scherer, Baxter, and Rintala (2016) stated that it is imperative for AT users to be involved in the selection of their AT devices in order to increase satisfaction and decrease device abandonment. Zapf et al. (2016) recognized that if the AT user is a child, it is important to include the child, to the extent it is possible, as well as the child's teacher and family in order to understand the user's activity participation, performance, and social arenas during assessment. Similar to Zapf et al., Copley and Ziviani (2007) concluded that student involvement in device selection is important and can lead to increased use of an assistive device. They recognized that using a team-based approach, including the student, during assessment could increase the likelihood of the device being used

across school and home settings and therefore decrease device abandonment (Copley & Ziviani, 2007). While studies show the importance of including a user in the assessment process, few studies demonstrate or explore a particular assessment tool for this process.

In addition to the satisfaction of the device user, AT assessment studies explore teachers' satisfaction with and attitude toward AAC interventions in the classroom and how that contributes to the adoption or abandonment of the intervention. Including teachers in the collaborative assessment process for a student's AAC intervention is important. Finke, McNaughton, and Drager (2009) reported that teachers feel they need significant support to help students who use AAC devices to participate in class. This includes support for themselves and for the students in the form of collaboration with other educational team members and training (Finke et al., 2009). Most important, this study concluded that a teacher's attitude may positively or negatively affect the inclusion of students with AAC devices in general education classrooms and that the experience of inclusion is largely driven by the perspective of the teacher (Finke et al., 2009). Garcia, Loureiro, Gonzalez, Riveiro, and Sierra (2011) reported complementary results in their study, which examined the satisfaction level of students who use AAC interventions and the educators who work with them. The results showed that AAC interventions could only provide support to students if their teachers are fully involved and committed (Garcia et al., 2011). While studies support involving the teacher in the assessment process for AT, there is little research that explores the use of a specific tool to help an educational team select an assistive device for a student.

Intervention

Literature on AT intervention specific to schools promotes the use of various types of AT and highlights that using these interventions can benefit a student, potentially leading to increasing student outcomes (Lidström & Hemmingsson, 2014; Flanagan, Bouck, & Richardson, 2013). A systematic literature review by Lidström and Hemmingsson (2014) explored the use of information and communication technology (ICT) for students with physical disabilities. While each study in the review differed in design, technology type, and participant population, the results found that ICT use is beneficial for students, especially in the areas of writing, spelling, and communication (Lidström & Hemmingsson, 2014). A study by Flanagan, Bouck, and Richardson (2013) found similar results. This survey study examined the perceptions of middle school teacher's use of various low-tech and high-tech AT during literacy instruction (Flanagan et al., 2013). The results of the study found that teachers who used AT during instruction felt that it was effective intervention for literacy support (Flanagan et al., 2013). While these studies differed in design and focus, they both show that AT intervention was effective, however, they do not address the impact that AT has on the user, nor the relative contribution of other interventions.

A study by Watson, Ito, Smith, and Anderson (2010) began to explore the impact of AT on the user. This study used the Student Performance Profile (SPP) to measure AT's effectiveness and to examine the relative contribution of other interventions to begin to understand the impact that AT had on the user (Watson et al., 2010). The results found that students made progress on their IEP goals when using AT and that this technology can be more effective than other possible intervention strategies including related support services and adaptations to specific curricular

tasks (Watson et al., 2010). The results of this study suggest that the use of AT and AAC intervention may have an impact on a student's ability to master his or her IEP goals and may have a greater impact than other interventions.

The literature on AT assessments explores the benefits of a collaborative assessment and the importance of user and teacher satisfaction on device use versus abandonment. The literature on AT interventions explores the benefits of using various types of assistive technology for students in schools and begins to explore the impact that AT has on a user. Further exploration is needed using a particular collaborative assessment tool that could help an educational team choose an AAC intervention for a student as well as explore the impact that the AAC had on the user. This study addressed the shortcomings that were identified in the literature review by exploring the Matching Assistive Technology to Child and Augmentative Communication Evaluation Simplified (MATCH-ACES), a collaborative assessment tool that considers a variety of factors such as the student's personality, environment, and teacher's perspective when matching a student with an AAC intervention. This study used the SPP to compare the student's AAC intervention with other interventions to begin to understand the impact that the AAC had on the student. The purpose of this study was to examine if the MATCH-ACES assessment can help a special education teacher (SPED) teacher and a speech and language therapist (SLP) select an AAC intervention for a student with special needs. Additionally, this study identified the relative contributions of other interventions that the student received to begin to understand the impact that AAC had on the student.

The study questions were:

1. Is there a relationship between using the MATCH-ACES to assess a student's AAC needs and improved achievement of the student's IEP goals as measured by the Student Performance Profile (SPP)?
2. What are the relative contributions of other interventions that, in conjunction with using the MATCH-ACES, contribute to a student's IEP goal progress as measured by the SPP?

Method

Case Study Participant: Adam

This study was a single case study and used a pretest-posttest design. The Institutional Review Board (IRB) at Texas Woman's University approved this study and all participants provided informed consent. The student, who will be referred to as "Adam," is a first-grade student with a diagnosis of autism. He lives in a New England town with his mother and older sister. He attends a public school and is in a special education program for students with autism. He spends 80% of his day in his special education classroom and attends lunch and recess with general education students. He visits his general education first-grade classroom for up to 30 minutes per day. He has an aide who works with him one-to-one throughout the school day. Adam receives support from occupational therapy, special education, speech and language therapy, and adapted physical education. His academic programming is based in the principles of applied behavior analysis (ABA) and he learns best through structure and repetition of skills. When introduced to new activities or changes in routine, Adam can become frustrated which usually results in aggressive

behaviors toward staff. Adam demonstrates limited verbal skills and is unable to communicate his basic needs. He will attempt to use grunts and other sounds to indicate preference or disapproval. He is unable to communicate his basic needs. At the time of the evaluation, Adam was beginning to approximate some words verbally, including “water,” “mom,” and “help.” Adam can become physically aggressive with staff and peers when he is unable to communicate. Despite current research that supports the inclusion of the AT user in the assessment process, Adam’s special education team, including his mother, felt it was best not to include him due to his complicated profile and tendency toward aggressive behaviors with communication challenges and routine changes. Adam’s mother was precluded from participating in this study due to research restrictions by the school district.

Adam received an AAC evaluation by his school district in the spring of 2014. Prior to the evaluation, Adam had used the Picture Exchange Communication System (PECS), which, according to his SPED teacher and SLP, was not effective in aiding his communication. The results of the district evaluation recommended that Adam receive a NOVA chat 7 AAC, a high-tech voice output device. This device uses software that allows a student to choose symbols, pictures, and/or words on the device, which generates a synthesized voice that speaks the relevant selection. The NOVA chat 7 is small and is easily portable around a school. Adam’s device arrived in June 2014, was used for four weeks, and then was returned to the company for repairs. The device was returned to Adam in September. Within three weeks, the device again was not working properly and was returned to the company for a second repair. Adam received the device again in November. By January 2015, Adam had only been using the device consistently for a total of six weeks. Adam’s SPED teacher and SLP were interested in using the MATCH-ACES to determine if Adam's device was still appropriate and to assess his progress with his IEP goals since receiving the first AAC evaluation in the spring of 2014.

Instruments

MATCH-ACES. The MATCH-ACES is a collaborative assessment tool that identifies students’ needs for AT and/or AAC based on their educational challenges, strengths, skills, and environment as they relate to the device features (Zapf, 2012; Zapf, Scherer, Baxter, & Rintala, 2016). This assessment tool includes eight forms, with each form focusing on the student, AAC device, environment, or a combination thereof. There are three forms that directly address the student. These include the Needs Analysis form, the AAC Evaluation form, and the Person Skills and Device Features form. First, the Needs Analysis form directs evaluators to rate the student’s current level of performance in various educational activities such as following directions, self-feeding, and classroom mobility. This form can help evaluators identify what challenges a student has that can be helped by AT. Second, the MATCH-ACES AAC Evaluation form includes questions about the student’s history, skills, and communication style to guide the evaluators in understanding the student’s need for AAC. Third, the Person Skills and Device Features form is a conceptual worksheet to assess the student’s current hearing, cognition, fine and gross motor skills, and current communication skills while considering various device features. The Technology Utilization Worksheet form addresses technology and the student’s environment. This form guides evaluators to list previously or currently used assistive devices and to rate them according to their effectiveness.

The MATCH-ACES includes two forms that can be scored and interpreted, the Predisposition to AT form and the Score form. The Predisposition to AT form includes three sections. In the first section, the student rates his or her experience with technology. If the student is unable to complete this section, an equivalent elementary section including pictures and graphs is available. If the student is unable to complete both forms, the teacher or parent can complete this section on behalf of the student. In the second section, the teacher is asked to rate the student's behavior and personality in school. Finally, in section three, the teacher or parent is asked to rate their own overall interaction with technology. Each section rating is on a 1 to 5 scale. Total scores are calculated for each section and then mean scores are obtained.

The Score form assesses the evaluators' feelings on the match between the student and the AT/AAC technology. The evaluators are directed to rate each question on a scale between 1 and 5 (1 being a mismatch and 5 being a good match). The scores are added and the mean score is obtained.

Based on the results of the MATCH-ACES forms, including the scores from both the Predisposition to AT form and the Score form, the evaluators decide if and/or what type of AT/AAC intervention is appropriate for the student. A Recommendation and Follow-up form can also be used to create an intervention plan with the chosen AAC intervention.

In a level three quasi-experimental study of the MATCH-ACES, Zapf et al. (2016) analyzed the predictive validity and internal reliability of the assessment tool. Zapf et al. found that the assessment has good internal reliability on all scales included in the predisposition to AT form, which indicates good internal consistency, Student Experience with Assistive Technology ($\alpha = .88$), Student Behavior/Personality ($\alpha = 0.84$), Teacher Perspective, ($\alpha = 0.88$). This study also noted that the MATCH-ACES has good clinical utility and the participants rated the assessment high in measuring the need for AT, the assessment addressed critical AT factors, was useful in making AT decisions, aligns with the IEP process and the assessment was consumer-centered (Zapf et al., 2016). Ease to administer, clear direction, and efficiency of the MATCH-ACES scores indicated that the tool was lacking in efficiency and administration (Zapf et al., 2016). Finally, Zapf et al. (2016) conducted a preliminary inter-rater reliability analysis using the Score form and the Recommendations and Follow-up form comparing mean scores, recommendations, and intervention plans. Overall, there was a 97% agreement across three experienced AT evaluators' responses on the MATCH-ACES (Zapf et al., 2016). Zapf et al. concluded that the MATCH-ACES is a validated, evidence-based assessment. However, further studies are needed with larger subject groups to strengthen the validation of this assessment tool.

Student performance profile. The SPP is recognized as a tool that measures the effectiveness of AT in a public school setting (Watson, 2012). This outcome measurement uses the student's established IEP goals to track progress by measuring the change in the student's ability with the addition of an assistive device (Watson et al., 2010). The SPP includes a pretest and posttest form. The pretest form includes student information, area of need for AT, IEP goals, and current performance level. The posttest form includes student information, post-score performance on IEP goals, current ability level (of previously identified relevant IEP goals), and contribution of interventions.

The SPP pretest form first directs evaluators to complete general information about the student including his or her age and diagnosis. Following this, evaluators complete the area of need section, which records the student’s school challenges such as communication, computer/technology, English/writing, history, mathematics, and science. After completing both of these sections, evaluators are asked to identify relevant IEP goals to track a student’s progress and to rate his or her current ability level using interval data from 0% ability to 100% ability with 10% increments. See Table 1 for SPP scoring information.

The SPP posttest form first directs evaluators to complete general information on the student including any major changes that could have affected the student’s progress (changes to the school building, student’s health/family, etc.). The posttest form then directs evaluators to rate the student’s current performance blindly based on the progress the student has made since the pretest. Following the completion of the posttest current performance level section, evaluators complete the contribution of interventions section. This section seeks to determine which factors contribute to a student’s progress on the AT relevant IEP goals. This section also measures the evaluator’s feelings on how much the AT has contributed to the student’s goal improvement in relation to other categories such as related services, natural development, and participation in general education instruction. This section is scored using an ordinal scale with scores ranging from 0 (no contribution) to 10 (substantial contribution). See Table 1 for SPP scoring information.

Table 1
SPP Scoring

	Data	Low	High
Current Ability Level	Interval	0%	100%
Contribution of Interventions	Ordinal	0	10

The SPP was specifically developed as an outcome measurement for use in the Ohio Assistive Technology Infusion Project, which provided students who have special needs with assistive devices (Fennema-Jansen, 2005). While the SPP did not undergo a typical test development process, limited pilot testing was conducted (Fennema-Jansen, 2005). While there is little research published on the psychometric properties of the tool, the use of the SPP as an outcome measure is supported in research studies. A study by Watson et al. (2010) found that the SPP was able to measure AT outcomes for students in a public school setting effectively. A dissertation by Fennema-Jansen (2005), which used the SPP as a measurement outcome on 1,760 students who received AT, showed that the SPP was effective in measuring AT outcomes and showed evidence of content and discriminant validity (Fennema-Jansen, 2005). A study by Watson and Smith (2012) found that the SPP had ease of administration, rating, and scoring; specificity to relevant measurement constructs (IEP) goals; and sensitivity to change in performance over time. This study concluded that this tool has the potential to measure the outcomes of AT intervention in schools effectively (Watson & Smith, 2012).

Data Collection Procedures

During the pretest data collection (A1), the SPP pretest form was used to document student information, area of need for AT, and IEP goals. During this time, the SLP and SPED teacher identified two IEP goals relevant to Adam's communication using AAC. The first goal was responding to a peer's greeting, which addresses how Adam answers a peer after the peer has initiated interaction with him, such as verbally approximating "hi" or using his AAC to say hello. The second goal was commenting on actions, which addresses Adam's ability to answer "what" questions about a person performing an activity, such as "what is the person doing?" Adam would use a sign, gesture, or AAC device to respond "drinking," "eating," "running," and so on.

Next, during intervention phase (B), the primary author trained Adam's SPED teacher and SLP in the use of the MATCH-ACES. Following this training, Adam's SPED teacher and SLP completed the MATCH-ACES on Adam. Then, during follow-up posttest (A2) data collection, the posttest SPP form was completed after three months of the student's consistent use of the NOVA chat 7. The forms completed included student information, post-score performance on IEP goals, and contribution of interventions. Finally, during the final posttest data collection (A3), the posttest SPP form was completed two months after A2 data collection. The forms completed included student information, post-score performance on IEP goals, and contribution of interventions.

Data Analysis

Data from the MATCH-ACES and the SPP, completed by the SLP and SPED teacher, were analyzed for this case study. First, the Predisposition to AT form and Score form were analyzed. Raw scores were calculated from each of the forms and mean scores were obtained and analyzed visually in a table.

Second, the SPP current ability level was analyzed. This section measured Adam's current ability level (ranging from 0% to 100% in 10% increments) at both pretest (A1) and two posttest data collections (A2 and A3). Both participants' scores were visually analyzed in tables. Comparisons between scores and time periods were made.

Finally, the SPP contribution of interventions was analyzed to understand the contribution of the AAC intervention compared with other interventions during the time of the study at both posttest collections (A2 and A3). Ratings are on a scale from 0 (no contribution) to 10 (substantial contribution). The results were analyzed to recognize similarities in scores between the SLP and the SPED teacher. Results were reported when both participants rated an intervention contribution with a score of 5 or higher. Results were incorporated into a table and analyzed visually.

Results

MATCH-ACES

Predisposition to AT form. The MATCH-ACES predisposition to AT form includes three sections – student experience with assistive technology, student behavior/personality, and the teacher perspective – and calculates the student's and teacher's predisposition to AT. Scores between 4-5 indicate a good potential match between student and technology. A score of a 3

means a potential match between student and technology with mild/moderate adaptation, and a score of 2 indicates it will be difficult for the student to use AT.

Table 2 displays the scores of Adam’s predisposition to AT form. The scores of Adam’s experience with technology section were high with a score of 4.6, indicating that both participants felt there was a potential good match between Adam and AT. They reported that Adam finds technology satisfying and that he enjoys using technology. Scores from the teacher perspective section were also high, with the SLP scoring 4.1 and the SPED teacher scoring 4.3, indicating that they would both match well with Adam’s technology. Both participants mentioned that they were willing to learn about technology and that they encourage the use of AT with students. Finally, scores for Adam’s personality were rated in the difficult/need support range with a score of 2.7. Both participants recognized that Adam’s challenges with communication make him easily frustrated and can result in aggressive behaviors.

Table 2
MATCH-ACES Predisposition to AT Results

	Student Experience with AT	Student Behavior/Personality	Teacher Perspective
SLP	4.6	2.7	4.1
SPED	4.6	2.7	4.3

Score form. This form assesses the requirements of the AAC and the resources of the student. Scores between 4-5 indicate a good potential match between the student and the technology. Results of this form from the SLP and the SPED teacher resulted in a score of 4.7. Scores on this section were relatively high because both participants considered the personal assistance to operate the device that Adam would receive from his aide. Both participants also considered that Adam would be able to meet the physical demands required of the device, would have adequate support and training in the device, and that the device would likely be able to be funded based on Adam’s intense need.

In conclusion, the completion of the MATCH-ACES assessment identified Adam’s personal traits and potential device features to help the SLP and SPED teacher make an informed decision about an AAC device for Adam. While completing the MATCH-ACES, the SLP and SPED teacher determined that Adam should use a high-tech device with support and training throughout the school day. They also noted that Adam would benefit from a device that was small, easy to carry, could include words and pictures, had a built-in keyboard, and could use digitized human voice output. Based on these results from the assessment tool, the SLP and the SPED teacher were able to reconfirm that the NOVA chat 7 continues to be the best device for Adam.

Student Performance Profile

Current ability level. At the SPP pretest A1 data collection for goal 1, responding to a peers greeting, Adam received a score of 10% on current ability level. At posttest data collection A2, the participants’ mean score showed a 50% goal improvement. At the final posttest A3 data

collection, the participants' mean score showed an overall 65% goal improvement. This shows a 55% increase in Adam's ability to respond to peers. See Table 3 for a detailed display of the results of Adam's current ability level at pretest and posttest for goal 1.

At the SPP pretest A1 data collection for goal 2, commenting on actions, both participants scored Adam at 10% for his current ability. At posttest data collection A2, there was a 20% improvement in Adam's ability level to comment on actions. Adam maintained a 20% improvement at the A3 data collection scored by the SLP. The SPED teacher did not complete the A3 data collection for goal 2. See Table 3 for a detailed display of the results of Adam's current ability level at pretest and posttest for goal 2.

Table 3
Current Ability Level

	A1	A2	A3	Mean Improvement
Goal 1 SLP	10%	60%	70%	
Goal 1 SPED	10%	60%	80%	55%
Goal 2 SLP	10%	30%	30%	
Goal 2 SPED	10%	30%		20%

Relative Contribution of AT Compared With Other Interventions

Goal 1: A2 data collection. For the first goal, responding to a peer's greeting, there were three non-AAC interventions that both participants scored above a 5 at the A2 data collection. The first contribution was Adam's participation in general education instruction. Additionally, both participants agreed that related support services were a large contributor to progress. Finally, both the SPED teacher and SLP rated personal assistance 8 and 9 respectively. This highlights that Adam's aide's help with Adam's AAC device had contributed to his progress in responding to a peer's greetings. Finally, both participants agreed that the AAC device provided a substantial contribution for Adam's improvement in responding to a peer's greeting. Results from the A2 data collection for goal 1 are included in Figure 1.

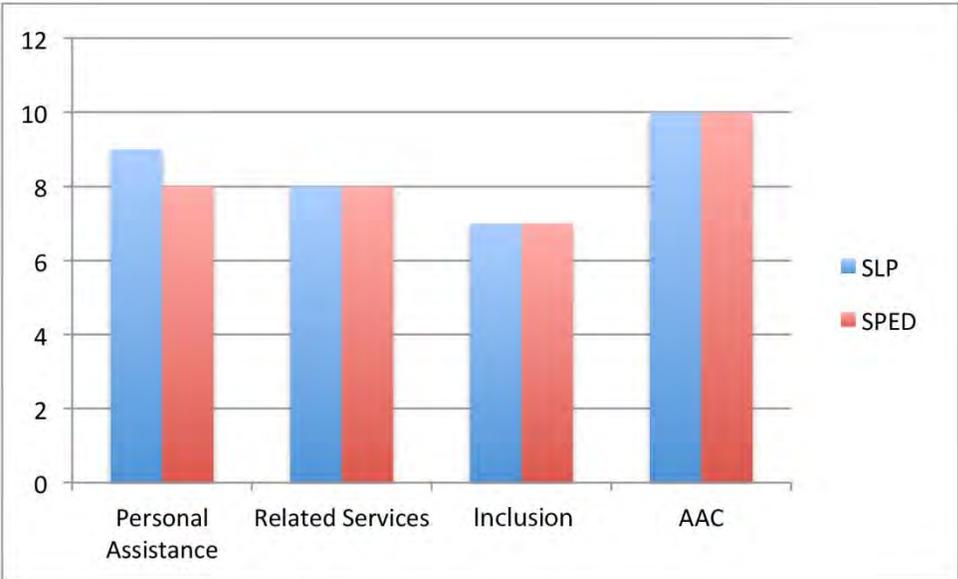


Figure 1: Relative contribution of AT compared with other interventions at A2 data collection for goal one

Goal 1: A3 data collection. At the A3 data collection for goal 1, there were five non-AAC interventions that both participants scored above a 5. One contribution included natural development. Additionally, both participants scored related services and personal assistance as being large contributors to Adam’s improvement with responding to peers. Finally, both participants rated Adam’s AAC device as a substantial element in Adam’s improvement responding to a peer’s greeting. Results from the A3 data collection for goal 1 are included in Figure 2.

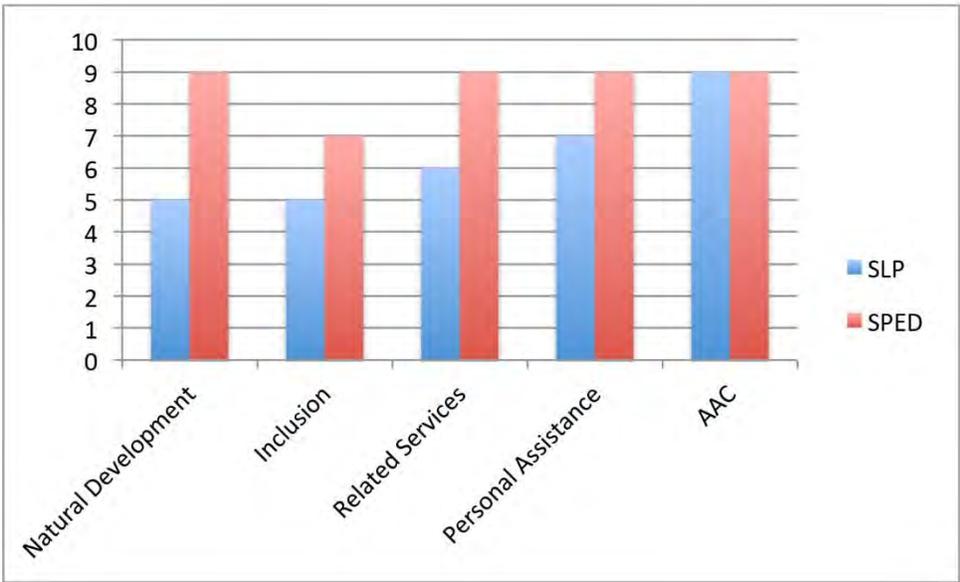


Figure 2: Relative contribution of AT compared with other interventions at A3 data collection for goal one

Goal 2: A2 data collection. For the second goal, commenting on actions, there were two non-AAC interventions that both participants scored above a 5 at the A2 data collection. The first non-AAC intervention was related services. The second contribution was personal assistance the SLP and SPED scores of a 5 and 8 respectively. Both the SLP and the SPED teacher recognized that the use of Adam’s AAC device made a substantial contribution in his ability to comment on actions. Results from the A2 data collection for goal 2 are included in Figure 3.

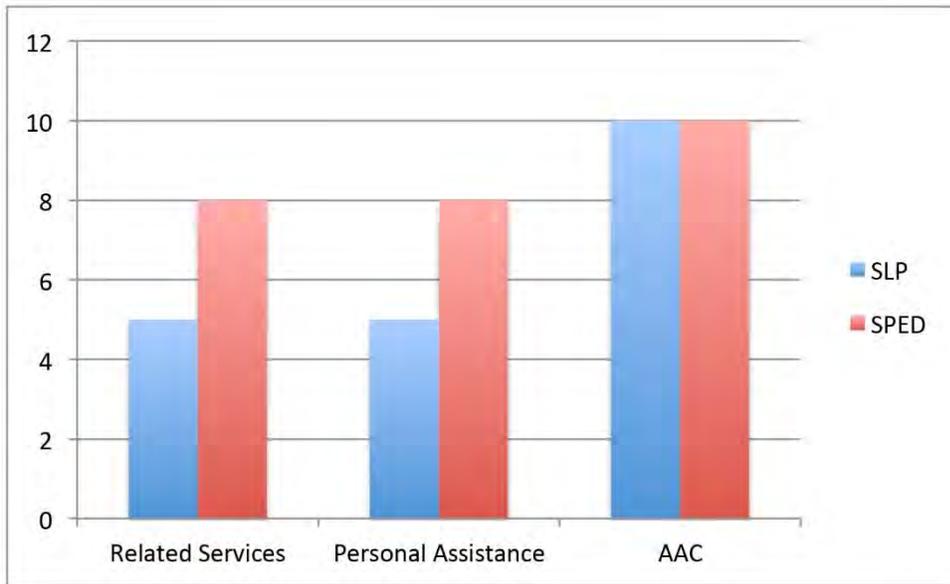


Figure 3: Relative contribution of AT compared with other interventions at A2 data collection for goal two

Goal 2: A3 data collection. At A3 data collection for goal 2, there were two non-AAC interventions that both participants scored above a 5. The first non-AAC intervention was natural development. Additionally, both participants noted that the personal assistance that Adam received, mostly from his aide, helped him make progress toward his goal. Both the SLP and the SPED teacher rated Adam’s AAC device to be the most substantial contribution to Adam’s achievement to IEP goals. Results from the A3 data collection for goal 2 are included in Figure 4.

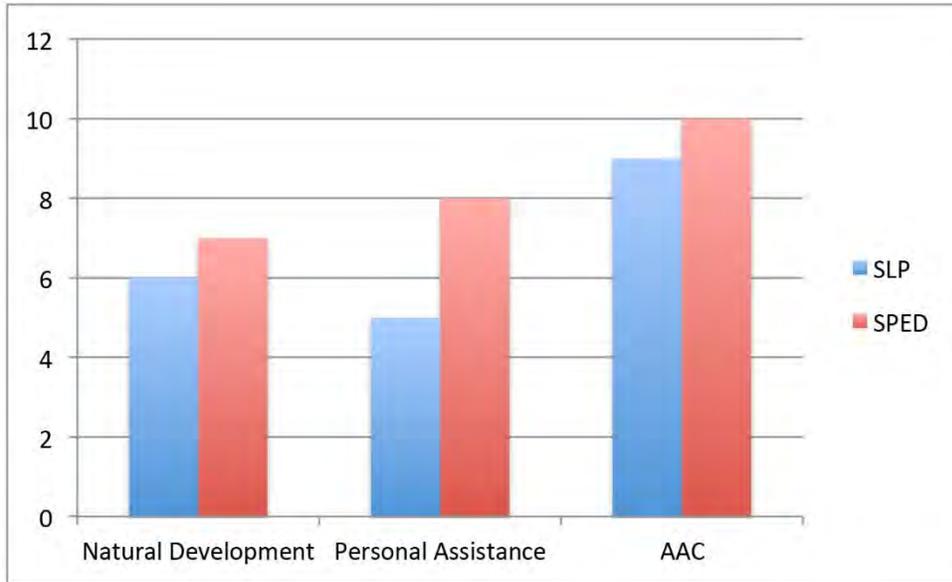


Figure 4: Relative contribution of AT compared with other interventions at A3 data collection for goal two

In summary, results from the SPP show that Adam made progress with both of his IEP goals including responding to a peer's greeting and commenting on actions. The two consistent contributors to Adam's improved IEP goals were related services and personal assistance. Results revealed that both the SLP and the SPED teacher reported that Adam's AAC device was the most substantial contributor to Adam's progress with his IEP goals.

Discussion

The purpose of this study was to examine if the MATCH-ACES assessment can help a SPED teacher and an SLP select an AAC intervention for a student with special needs. Additionally, this study identified the relative contribution of other interventions and the AAC intervention. Addressing a lack of evidence in this area, this case study investigated assessment tool use to match students with special needs to assistive devices and to understand the impact that an AAC intervention can have on a student while simultaneously considering other interventions that a student receives.

Overall, results from the SPP show that Adam made progress with both IEP goals using the NOVA chat 7. This device choice was reconfirmed from a previous evaluation after the SLP and SPED teacher completed the MATCH-ACES. The results show that there was a relationship between using the MATCH-ACES and improved IEP goals. Results revealed that personal assistance and support from related services also made an important contribution to Adam's IEP goal improvement. Additionally, the highest rated and consistent contribution to Adam's IEP goal improvement was the use of his AAC device. According to the SPP results, the SPED teacher frequently scored Adam higher than the SLP. This may have been affected by the amount of time that both participants spend with Adam. The SPED teacher spends more time with Adam, educating him in class 80% of the day, where the SLP service delivery involved only brief increments of time with Adam over the course of each week. The SPED teacher may have

been able to observe his abilities across the school day more often than the SLP. Additionally, the scoring on the SPP is subjective and can be skewed by participants' personality, bias, and dispositions.

Personal Assistance

Results from the SPP revealed that the personal assistance that Adam receives from his full day, one-to-one aide contributed to his progress toward his IEP goals. This finding suggests that personal assistance had a direct influence on Adam's use of the device, which is consistent with the results of the MATCH-ACES assessment. During the assessment, the SLP and the SPED teacher both noted that there would be a good match between technology and Adam when they were considering the one-to-one assistance that Adam would have from his aide.

The literature on AT for students in schools indicates that additional support is important, not only to help a student use a device, but for a teacher to support a student's device use (Barker, Akaba, Brady, & Thiemann-Bourque, 2013; Finke et al., 2009). While these studies differed from this case study in terms of focus and design, the results are similar, in that additional support is necessary to support a student's use of AT.

A survey study by Barker, Akaba, Brady, and Thiemann-Bourque (2013) explored preschoolers' AAC use in the classroom. The survey results showed that teachers, other classroom adults, and peers infrequently used the students' high-tech AAC devices (Barker et al., 2013). Overall, students were using their AAC devices only five or six times a day (Barker et al., 2013). Additional results showed that students who had more peers communicating with them using their AAC devices demonstrated larger increased skill growth over the course of the study, compared with students with whom fewer peers interacted (Barker et al., 2013). This shows that a student not only requires teacher support but peer support as well to use their AAC devices (Barker et al., 2013). Similarly, results from a qualitative study by Johnson, Inglebret, Jones, and Ray (2006) concluded that additional support for a user's device use can be an important factor in that person's success with the device. If the facilitator is motivated to help the student access and practice the device, the user will be more likely to experience success with the device (Johnson, Inglebret, Jones, & Ray, 2006).

Additionally, the results from a qualitative study by Finke et al. (2009) mirror finding by Barker et al. (2013) and Johnson et al. (2006) regarding the importance of assistance. In Finke et al., general education teachers who worked with students who used AAC devices recognized that there was a need for additional supports in the classroom including well-trained educational aides to help students use AAC devices successfully. This finding is consistent with the assistance provided to Adam from his aide to help use and incorporate his AAC device during the school day. The personal assistance that he received from his aide contributed to the use of his device, the incorporation of his device into the classroom for social support, and ultimately his improved IEP goals.

Related Services

In addition to the support that Adam received from his aide, results from the SPP show related service support from disciplines such as speech and language therapy, occupational therapy,

adaptive physical education, and special education contributed to Adam's improved IEP goals. This finding suggests that additional assistance from various disciplines is important to support a student who uses an AAC intervention in school.

Results from a quantitative study by Watson et al. (2010) showed similar results as this study. Watson et al. explored the performance outcomes of students using AT in schools. Using the SPP as a measure, the study found that AT provided by a multidisciplinary team that is committed to seeking and implementing AT may have a significant effect on a student's IEP goal improvement. While using different methods and focus, Finke et al. (2009) found similar results. In the study, general education teachers noted that related services were a critical element in the inclusion process for students who use AAC devices in school (Finke et al., 2009). Additionally, the study reported that teachers felt that they need to collaborate with related services on a daily basis, and that having their support in the classroom contributed to the student's success in using AAC devices in school (Finke et al., 2009). The results from this study are consistent with results from literature showing that students with assistive devices are best supported by a variety of related service providers.

Augmentative and Alternative Communication

Overall, the results from the SPP show that both the SLP and SPED teacher felt that the most important contribution to Adam's improved IEP goals was the use of his AAC device, reconfirmed by the completion of the MATCH-ACES. This finding is consistent with the results of many studies that explore communication development using an AAC device (Millar, Light, & Schlosser, 2006; Schlosser & Wendt, 2008). Results from a systematic review conducted by Schlosser and Wendt (2008), showed that most children with autism who use an AAC device experience a modest increase in speech production. Additionally, a research review by Millar, Light, and Schlosser (2006) reviewed 27 cases and found that 89% of the participants studied demonstrated modest gains in speech production.

In conclusion, the MATCH-ACES was successful in considering the match between Adam, the device, and the personal assistance that Adam would receive. The findings from the research suggest that comprehensive support from related service staff as well as personal assistance might help students be successful using an AAC intervention in school, making it more likely that students would experience IEP goal improvement. Finally, the most important contribution to Adam's goal improvement was his AAC device and the support that he received in order to use it.

Limitations

This study is limited by the single case study pretest-posttest design. This study represents one student in an elementary school in an affluent community in New England where the primary author was employed. Therefore, results of this study are not generalizable to other populations. This study did not include statistical analysis and the outcomes could only be inferred through visual analysis. Additionally, this study is limited by the use of the MATCH-ACES and SPP. Both tools have limited research published on their psychometric properties and are not widely used.

Future Research

Future research should address the MATCH-ACES assessment tool at various education levels and socioeconomic communities. Including a larger population or using a case series design would allow for statistical analysis. Additionally, further research is needed to examine the significance of the contributions of other interventions to confirm and identify critical supports for students with special needs. Future research should also address the use of the MATCH-ACES including the family and student when possible.

Conclusion

With an increasing number of students with special needs being included in general education classrooms, the need to support students who use AT and AAC is likewise increasing. This study used the MATCH-ACES assessment tool to help a SPED teacher and an SLP choose an AAC intervention for a student and examined the student's IEP progress and the relative contribution of other interventions. The first conclusion of this case study is that there was a relationship between using the MATCH-ACES and improved IEP goals. The second conclusion was that related services and personal assistance were important contributors to the student's IEP goal progress. The results provide evidence that the student's AAC device was the most important contribution to his goal progress. Further research should examine the significance of the contributions of other interventions, as well as the AAC intervention, using a larger sample size over an extended amount of time.

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