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How Do Augmentative and Alternative Communication (AAC) Systems Impact Students

Learning During Literacy Routines?

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Abstract

This paper will focus on communication and why it is so important during literacy routines in the classroom. The research will serve as a gateway into understanding the world of how communication and literacy tie together and what the impact of using Augmentative and Alternative Communication devices could do for a student. The research will focus on emergent literacy routines for students with significant cognitive disabilities and complex communication needs and to what degree the communication systems help the students communicate and comprehend the questions being asked of them.

Keywords:

Augmentative and Alternative Communication devices (AAC), Deaf and Hard of Hearing (DHH), Complex Communication Needs (CCN)

How Do Augmentative and Alternative Communication (AAC) Systems Impact Students Learning During Literacy Routines?

“Communication is both a basic need and a basic right of all human beings” (Brady et. al, 2016). For some, communication can be a big challenge if they do not have the right equipment or aide to speak. Students who are non-verbal, have language deficits, or have significant cognitive disabilities and complex communication needs (CCN) may need the right equipment in order to access this basic human right of communication. Take the challenges of communication and couple them with literacy at school and there is an even bigger challenge because communication during literacy routines is a frequent problem for individuals with special needs (Bruce et. al, 2016). If you do not have access to something, how are you supposed to understand it or communicate about it?

As educators of students with significant disabilities, most believe in the basic right for all to communicate, understanding communication’s inherent power. Despite this belief, many students who are considered to have CCN do not have access to AAC devices and have limited communication instruction from educators due to the complex nature of the instruction and at times, the device (Mandak, Light, & Boyle 2018). Luckily, AAC encompasses a wide range of tools from low tech (e.g. sign language) to high tech (e.g. sophisticated speech-generating devices) and everything in between. So, with some professional development and work with speech-language pathologist, these tools can, and should, be implemented by educators into literacy routines and other parts of the day while being personalized to meet individual needs (Binger, Berens, Kent-Walsh, & Taylor, 2008). These devices can then be a basis of information to help aid with life skills, social skills, and communication skills to help people communicate

with the world around them (Morin et. al, 2018). Just as verbal communication can be used for a variety of functions, so can AAC systems. Possible functions can include but are not limited to requesting attention, requesting tangibles, using devices during social routines, greeting others, commenting on an object or action, escaping or avoiding attention, and escaping or avoiding an activity (Davis, Barnard-Brak, Dacus, & Pond, 2010).

Literacy skills are one of the most necessary and vital life skills to learn because they help a person participate successfully in education, employment settings, and society at large (Mandak, Light, & Boyle 2018). The ability to read and write allows individuals to build relationships, make numerous choices, and access the technology and tools of our ever changing 21st century. Although it is well agreed that literacy skills are a highly desired skill for all, these skills are especially important for individuals with CCN who use AAC. Not only do literacy skills support participation in society, but they also enable independence for individuals who use AAC as well (Mandak, Light, & Boyle 2018). Since a child's language environment makes a significant impact on their learning, students with limited speech and significant disabilities need consistent access to AAC systems/devices along with targeted instruction to help their continued communication growth (Geist, 2020).

Background

Over the past four years, with the help of the school's speech-language pathologist, the researcher has trialed and implemented the use of different AAC devices in the classroom. Since the students in the classroom now had a better idea of how to use the different devices, it was time to start implementing the use of the devices during different literacy. The routines would include whole group reading, small group reading, word work, and independent reading time.

Incorporating these devices would allow the researcher to see if the use of the devices during these times helped students with the literacy skills being taught and the students' overall comprehension of questions being asked. The hope is that if students have access to these AAC tools, they can then impact student's literacy learning in a positive way. Being able to have hard evidence to show administration and parents how these devices are affecting students learning will also prove how successful students can be in the classroom setting and how they are understanding the world around them.

Review of the Literature

Communication Supports

Communication and the lack thereof have been an issue for over a century (Bruce et. al, 2016). One journal article about communication needs for individuals with disabilities was written based on the research conducted by National Joint Committee for the Communication Needs of People with Severe Disabilities. The team reviewed practices for schools on assessments in communication, goal selection in communication, interventions to improve communication, interventions to improve environmental supports for communication, and service delivery. Once the research was complete, the team then made revisions on the national document for the Communication Bill of Rights. Their research concluded that since 1992 when the Communication Bill of Rights was first written, there have been significant changes and advances in the way persons with disabilities communicate, yet most individuals still have unmet communication support needs. It was the National Joint Committee's goal to continue to educate and advocate for persons with communication needs to help with integration and inclusive

practices, build and increase knowledge and awareness, guide research, and promote effective communication and literacy skills (Brady et al., 2016).

In addition, a preliminary investigation regarding the use of a picture exchange system used by individuals with blindness and autism (Lund & Troha, 2008) is another fine example of how we need to help individuals communicate to understand the world around them. The article discusses how a low-tech picture system could be used as a communication device and how, if used appropriately, could be taught to students through a three-step process. The process was to first have students exchange a tactile symbol for a preferred item with their communication partner next to them. Once learned, the students would move to requesting preferred items in the same manner, but the communication partner was further away. The third step was to have the students discriminate between two similar tactile symbols. This then would be the first steps into moving towards a 2-D picture communication system known as picture exchange communication systems, or PECS. Students could use the pictures as tools helping them to understand and comprehend what is being taught to them, being asked of them, and responding using the symbols. The results were shocking; researchers found that using these different tactile symbols with instructional strategies based on PECS may be an effective method of teaching individuals who are blind and have autism to make requests (Lund & Troha, 2008). This is the best news because it continues to show that the use of communication devices whether low--tech or high--tech can be used to instruct students with significant disabilities to communicate and comprehend literacy.

Furthermore, students with limited speech and significant disabilities need consistent access to AAC systems and require targeted instruction aimed at the growth of their communication skills (Geist, 2020). Geist outlines the significant role teachers and other classroom staff can

play in the delivery of evidence based AAC instruction in the classroom. One project discussed was called Project Core. Project Core is a project funded by the U.S. Department of Education, Office of Special Education Programs. Project Core was created to provide teachers, teacher aids, and other classroom staff with the proper training, resources, and tools needed to teach picture communication. The approach to Project Core was to ensure that all students have access to personal AAC systems with a prioritized set of core vocabulary, called universal core, and its embedded communication instruction into the daily activities and academic routines of the school day (Geist, 2020).

Unique communication needs

Although communication is a huge issue for most students with CCN, it turns out that they are not the only students who struggle. Individuals with hearing loss and one or more additional disabilities struggle to find the proper communication systems as well. Research was conducted in 2010 regarding the use of aided communication systems using non-electronic and electronic systems. The research was done among 32 participants who had to meet four specific areas of criteria: use of aided devices, devices for expressive communication, a person with a permanent hearing loss coupled with another disability, and efficacy of the AAC systems (Davis et al., 2010). These studies were important because the researchers wanted to come up with an answer on how to help persons with unique communication needs, due to hearing loss and other additional disabilities, communicate effectively throughout their day and overcome the obstacles that their communication needs created. The unique communication needs of the participants stem from an inability to use sign language as a sole means of communication because of their other impeding disabilities. These unique communication needs showed that, “approximately

10% of individuals with hearing loss also have an intellectual disability, while another 9% have a learning disability, 3.5% considered deaf-blind, and 3% as having cerebral palsy” (Davis et al., 2010). The research concluded that 64% of the time, the use of the AAC system either aided or independently used was beneficial for the participants and helped them with their expressive communication needs (Davis et al., 2010).

Likewise, Bruce and Borders (2015) also help to understand these unique communication needs. For example, they detail three specific areas of deaf and hard of hearing: DHH with intellectual disabilities, Autism Spectrum Disorder, and deaf blindness. The research showed that early identification along with placement in a suitable classroom, different theoretical perspectives, and evidence-based practices would help aspects of communication and would create a framework. Being matched with an appropriately prepared professional who could help build on the individuals' strengths and needs would help as well. The article also coincides with the other articles and explains, that delays in communication and language development may result in isolation, frustration, and reduced quality of life. Language development in children who are DHH is often delayed because of reduced access to language, including a lack of opportunities for those whose first language is American Sign Language, to experience exposure to fluent models. Communication and language development are even more likely to be delayed in children who are DHH with one or more disabilities (Bruce & Borders, 2015). The article also goes on to explain and give detailed interventions for each area of students who are DHH. Some of those interventions include 3-D objects, tactile objects, photographs, and so much more.

Similarly, Jones and Hensley-Maloney (2014) help us to understand the unique communication needs of students with coexisting visual impairments and learning disabilities as

well. They explain that the coexistence of these disabilities' present unique challenges for many students and their teachers. They say that it is vital for teachers to understand and have the knowledge of this population of students as well as instructional strategies targeted at meeting their individual needs. Jones and Hensley-Maloney also give suggestions for effective interventions to help cultivate and increase social skills development through promoting independence, increasing receptive language skills, and developing self-determination skills. In order to teach these though, teachers need an understanding that these areas are all interrelated, and all are necessary elements for instructing every individual in every classroom. Teachers need to make sure they are helping students by making the correct academic accommodations, fostering appropriate social skills, promoting independence, and helping building self-determination skills through systems and throughout daily routines (Jones & Hensley-Maloney, 2014).

Methods

Participants

In this action research study, there were two students who participated out of a classroom of eight students. The classroom is a special education self-contained life skills classroom that is a mix of three boys and five girls ranging in ages from 8-11 years old. This class includes students who are verbal, non-verbal, and partially verbal. The students have a wide range of diagnosis including Attention Deficit Hyperactivity Disorder, traumatic brain injury, learning disabilities, intellectual disabilities, and Autism. Along with their diagnoses, most of the students also have complex communication needs.

Student N is a 9-year-old female who is diagnosed with Attention Deficit Hyperactivity Disorder, Autism, and an intellectual disability. N demonstrates significant delays with her

receptive and expressive language skills and is partially verbal. Having these delays means she will speak simple phrases with single—word or two--word utterances and uses a variety of picture--based symbols throughout the day to communicate. She will verbally request wants with single--word utterances but does not always advocate for herself (e.g. if she is missing something needed to finish a task, she may not ask for it without prompts). She can answer personal questions about herself but appears confused by expectation of question formats both socially and academically. N also shows signs of echolalia and will often repeat the question asked or repeat the last word of the question back to her communication partner. Her statements are often not on topic nor grammatically correct as well.

Student J is the second student in the study and is a 9-year-old male. J is diagnosed with traumatic brain injury, Lennox-Gastaut syndrome, a mild hearing loss, and cortical vision impairment (blindness). J demonstrates significant delays with both his receptive and expressive language skills and is completely non-verbal. He relies heavily on his body movements and vocalizations (loud indistinctive noises) to communicate. J will also feel tactile objects which represent different wants/needs/tasks throughout the day to help him communicate as well. He will use a single message button to successfully participate in social interactions with peers and needs high levels of modeling--verbal, visual, and tactile--to help him with his receptive and expressive language.

Data collection

For this action research study, data was collected for six consecutive weeks. The data was collected during a 20--minute whole group reading session and a 30--minute small group reading session once each, every school day. The data was also collected during a 20--minute

independent reading time and a 20--minute independent word work time, every school day. Once the data was collected, it was then put into a Google Form and collected into an Excel spreadsheet to be analyzed.

For the first two weeks of the study, students did not use any AAC systems during any literacy routines; the use of no devices was not new to the students. The use of no devices served as a baseline to show how the students were able to produce a means to communicate on their own since they had no system to use. The participants used multiple methods of expressive communication utilizing gestures or signs when needed. The researcher then collected data to show, did the student gesture at or to something? Did the student point to a picture or book? Did the student sign something they knew? Or did the student just not answer? This was important data to collect because once systems were being used, it would show if the system were helping during these literacy times or not. While collecting data for the first two non-system weeks, the researcher noted if the student was able to answer the question by pointing to something or signing and whether the student was able to do this all independently or with aid. Noted, was also if what they were pointing to or signing, showed the students comprehension of the question asked or if the student was giving a random answer.

For the third and fourth weeks, the researcher introduced the universal core boards during the literacy routines. The universal core board is a 36-word, low-tech, laminated paper board that incorporates picture symbols into a set of highly useful words that are taught to beginning communicators so they can use words across a variety of contexts throughout the day (Geist, 2020). While the core boards were not new to the students, they had never used them for any academic work, only social situations. Data was again collected during whole group and small

group sessions, and during word work and independent reading sessions as well. The students could use the core boards to answer questions such as yes/no, multiple choice, short answer, or fill—in—the--blank and to express anything they wanted to communicate. When asked a question, the student answered by choosing the word or words on the core board they had in front of them. Pointing to the specific word or words during the routines allowed the researcher to know what kind of message each student was trying to communicate. The researcher noted if the student was able to answer the question by pointing to words on the board and whether they used a single or multi-word phrase. She also noted if what the student was saying showed their comprehension of the question asked or to the idea they were expressing.

Finally, data was collected again during whole group and small group sessions, and during word work and independent reading time. The students this time, however, were to use the high--tech iPad communication system to answer questions or express ideas instead of using the core boards or no system at all. The communication app on the iPad system had hundreds of options for the students to choose from, and students could choose whatever they wanted whenever they wanted during the literacy routines. When asked a question or to express an idea, the student had to answer by picking the words on the iPad communication system they had in front of them. Once a student hit the word or words, the system then spoke for them. The researcher noted if the student was able to manipulate the system to answer the questions or express thoughts and ideas by choosing words on the system and whether the student used a single or multi--word phrase. The researcher also noted if the student was able to do this all independently or with assistance, and if what the students were saying showed their comprehension of the question being asked or if it was related to the idea they were expressing.

Findings

Baseline: No systems

Baseline data was taken during weeks one and two. The researcher collected data to show what kind of questions were being asked of the students, during what routine were the questions asked, how students were able to respond without a system, and if students had any comprehension behind their answer. During these two weeks, questions were asked such as yes/no, multiple choice, fill in the blank, and short answers. At times students also answered with an idea of their own or simply did not have anything to say. 58.3% of the time students answered these questions during small group instruction, as indicated in figure 2, while the other 41.7% of the time questions were answered during whole group work, word work, and independent time (2). Student N and Student J were able to answer questions 66.7% of the time by pointing at a book, picture, or object when asked multiple various kinds of questions (3). Figure 3 also indicates that students were able to sign an answer 8.3% of the time, and 25% of the time students were unable to give an answer using the previously stated methods. The researcher was also able to discover during this time that Student N and Student J had some comprehension to their answer 25% of the time, but 75% of the time the answers given were random and had no meaning of comprehension behind them as indicated in figure 4.

Figure 1

What kind of question did the student answer?

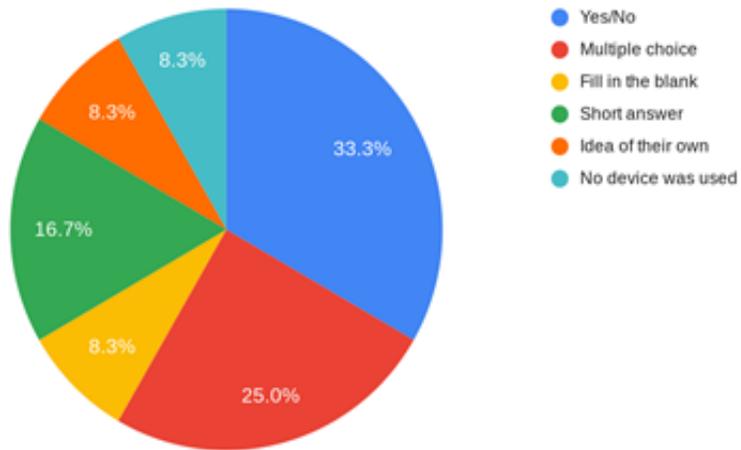


Figure 2

During what routines were the students answering questions with no system being used?

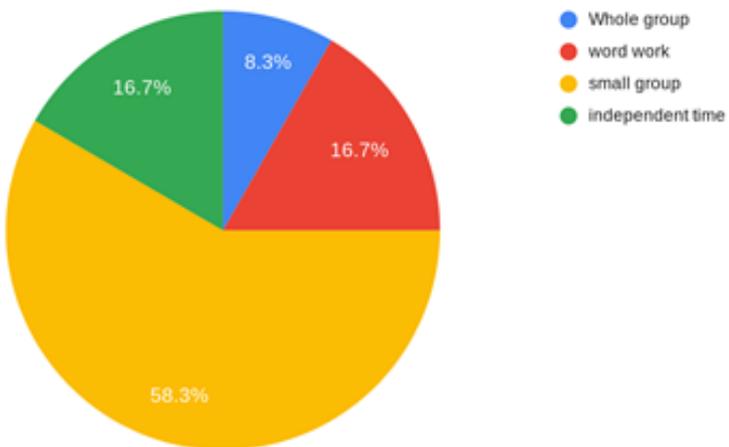


Figure 3

How did the student answer?

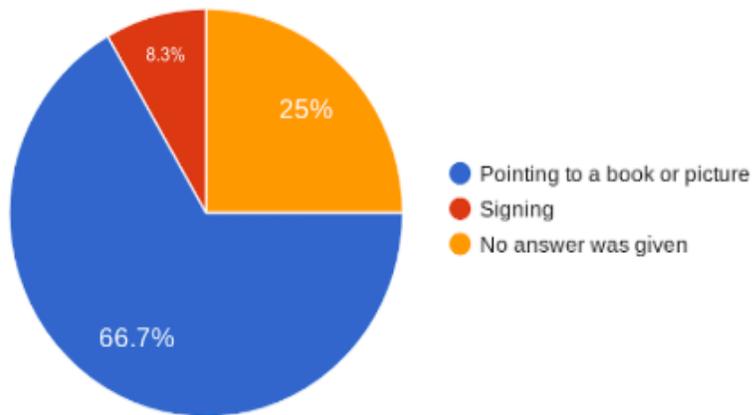
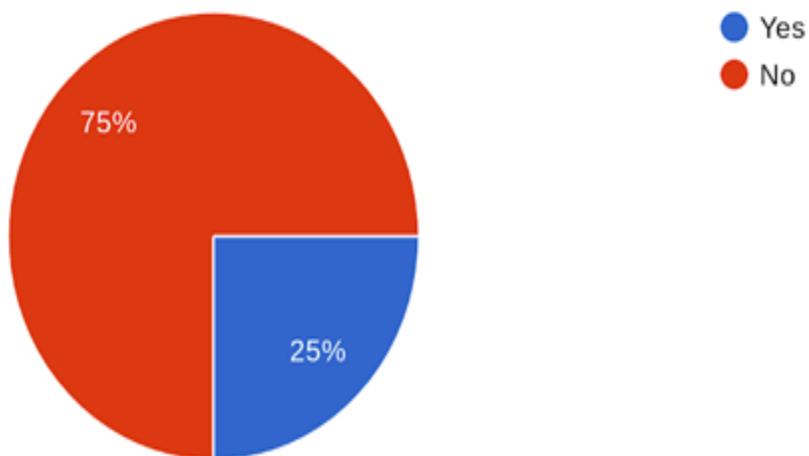


Figure 4

Was there comprehension behind the expressive language?



Universal Core Boards

After baseline data was collected, Student N and Student J were given the opportunity to answer questions during these different literacy routines for two weeks using a low--tech universal core board. Throughout this time the researcher collected data asking multiple varieties of questions. Figure 6 indicates that the students used the core boards 51.2% of the time during small group lessons while students used the boards 24.4% during independent time. Students used the systems least during whole group lessons 22% of the time and word work 2.4% of the time (6). When the core board was in use by the students, 63.4% of the time students answered a question with a single word from the board as indicated in figure 7. 29.3% of the time the students were able to use two or more words in a phrase to answer a question, and 7.3% of the time no system was used, and the students used a different means to answer the questions (7). The researcher determined that 78.8% of the time students did have comprehension behind their answers (8).

Figure 5

What kind of question did the students answer using the core board?

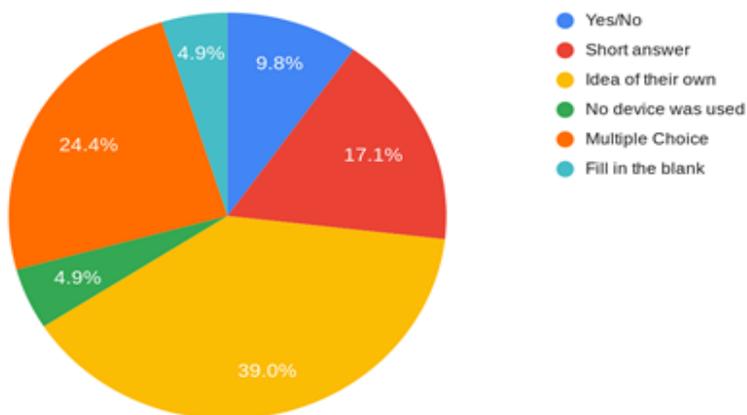


Figure 6

During what routines were the students answering questions with the core boards?

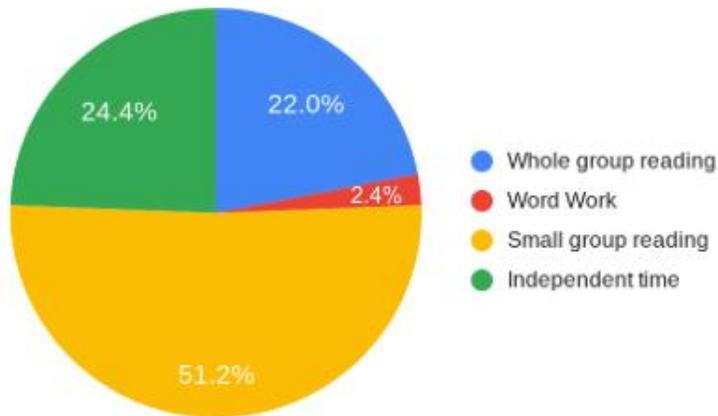


Figure 7

How did the students answer using the core boards?

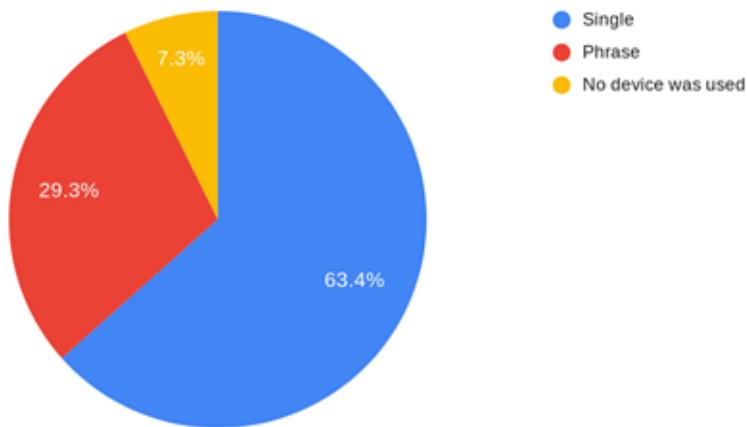
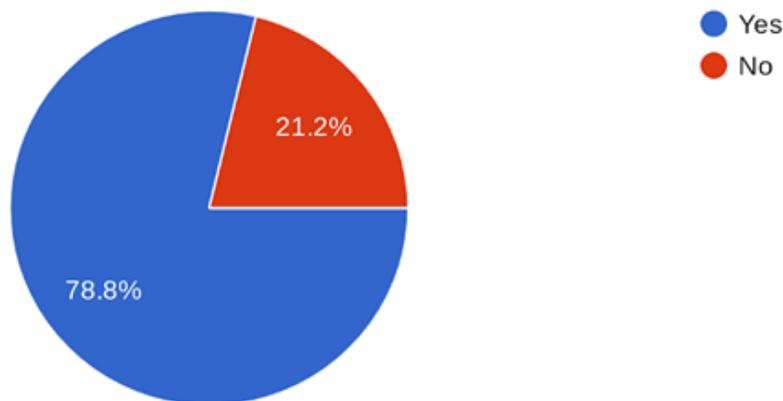


Figure 8

Was there comprehension behind the expressive language that the students expressed when using the core board?

**Speech Generating System-iPad communication app**

Preceding the two weeks of use of the universal core boards, Student N and Student J were given the opportunity to use a high-tech system through a communication app downloaded on an iPad. The communication app was used during the same literacy routines. Figure 10 indicates students used the app 52.5% of the time during small group work, 25% of the time during independent reading time, 20% of the time during whole group lessons, and 2.5% of the time during word work. While using the communication system students were able to answer with an idea of their own 37.1% of the time while 28.6% of the time students were answering multiple choice questions as indicated in figure 9. Figure 9 also indicates 14.3% of the time students were answering short answer questions, 8.6% were yes/no questions, and 5.7% were fill—in—the--blank questions or the student did not answer at all. When answering these different questions, the students answered 56.3% of the time using a single word, 34.4% of the time using two or more words in a phrase, and 9.4% of the time the student did not have an answer as indicated in

figure 11. The researcher was able to determine that 84.4% of the time the answers that the students gave had comprehension to them and 15.6% of the time the answer did not (12).

Figure 9

What kind of questions did the students answer using the iPad communication system?

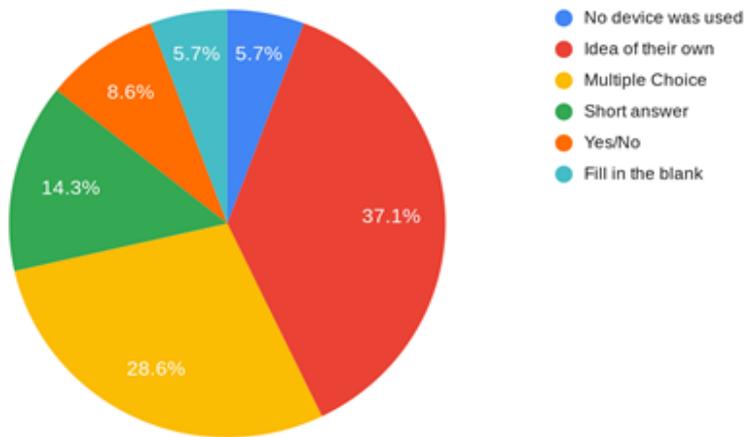


Figure 10

During what routines were the students answering questions using the iPad communication system?

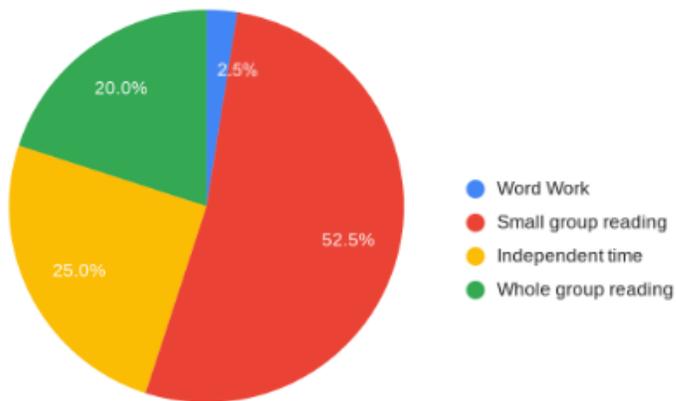


Figure 11

How did the students answer when using the iPad communication system?

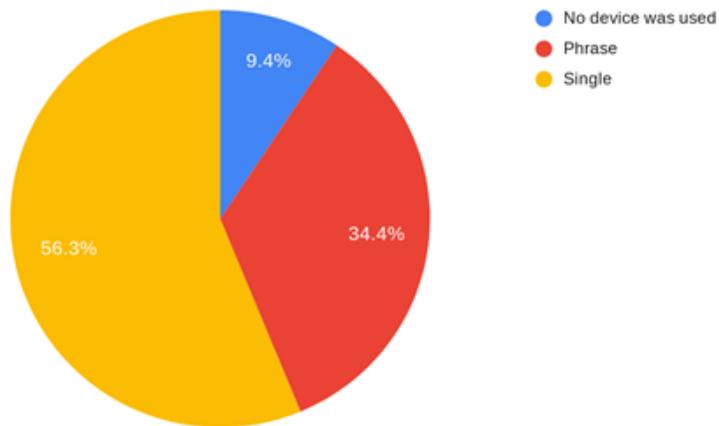
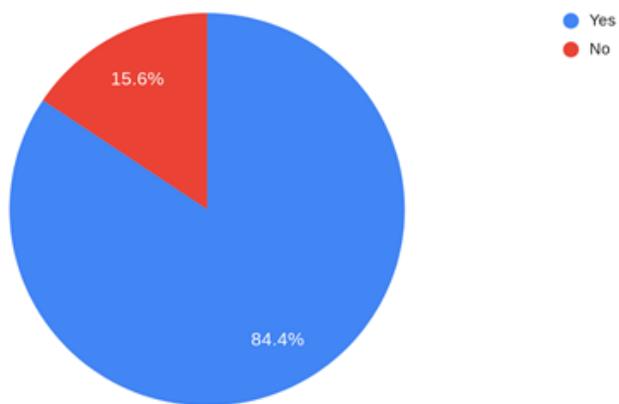


Figure 12

Was there comprehension behind the expressive language the student expressed when using the iPad communication system?



Discussion

Summary of major finding

Overall, the data from the action research shows a positive trend in the students' use of the different AAC systems; these findings agree with the findings from Davis et al., 2010. The results of this study show that students with multiple disabilities and CCN can improve their comprehension during literacy routines and their expressive language as well using communication systems. The data showed that using the systems during the literacy routines helped students answer questions through their expressive language and that most of the expressive answers had comprehension behind them. The data also showed that students were more apt to answer questions with the presence of a system rather than with the absence of a system. These results are also in agreement with Geist, 2020. The consistent use and access to AAC systems and targeted instruction helped with the growth of students' communication skills.

Future Studies

In the future more research is needed to show why students are using the systems more in small groups than any other routines. Further studies are also needed to show the correlation between students' expressive language and using single words, phrases, or ideas of their own to answer a question. However, there is promising data from the researcher and literature reviews that show with intensive instruction through intervention of the different systems, students can become more fluent and comfortable communicating in a variety of settings using AAC systems.

Conclusion

Students with significant disabilities and CCN need to have their voices heard; AAC devices can help with this. These devices can be low--tech or high—tech and are a basis of information to help aid with life skills, social skills, and communication skills (Morin et. al, 2018). Using research to guide teachers in understanding the world of AAC systems and communication will help impact the use of AAC systems during literacy routines in the classroom. This research will help teachers focus on emergent literacy routines and to what degree the communication systems help the students communicate and comprehend the questions being asked of them. The quantitative data of this research study proves that through specific interventions, students can improve their comprehension during literacy routines and their expressive language as well using communication systems. These interventions and modifications of the AAC systems can impact a child's learning in many ways. Although the learning may take several trials of different systems, there can be a way for every students' voice to be heard because every child should know that they have a right to a full communicative experience.

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