Professional perceptions of the effectiveness of visual communication systems and their applications for functional communication interventions for individuals with Autism Spectrum Disorder

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Abstract
Background & aims: This study investigated the perceptions of educational professionals in regard to the effectiveness of visual communication systems and their applications as a functional communication intervention for individuals with Autism Spectrum Disorder (ASD).

Methods: One hundred and one individuals from diverse educational backgrounds, school districts, educational services, and various states were surveyed for this study. All participants in this study served individuals with Autism Spectrum Disorder in a clinical and/or school setting.

Results: The study found that aided augmentative and alternative communication (AAC) systems were widely utilized, and participants perceived these systems as the most effective for individuals with Autism Spectrum Disorder. It also found that the use of low level tech aided augmentative communication systems such as Picture Exchange System and high level tech systems such as voice output systems that were strictly computer based, were dependent on the individual’s abilities and needs. Finally, the study found that the use of photography and photo journaling techniques had positive outcomes for individuals diagnosed with Autism Spectrum Disorder and other students in the learning environment.

Conclusions: The results revealed that the overall consensus of educational professionals that serve individuals with ASD agreed that aided AAC systems were more effective methods to foster and enhance functional communication. In terms of effectiveness of the level of technology utilized within the system, it depends on the needs and abilities of the individual with ASD. Participants, however, did agree that photography and photo journaling techniques may provide positive attributes to all students and not only those diagnosed with ASD.

Implications: The ability to modify or alter the ways in which AAC systems are created and implemented may address the need to individualize the systems in terms of the needs and abilities of the individual with ASD. The results inform educational practices as they highlight that a majority of the professionals that participated in this study need further professional development with the understanding and application of these systems in order to better understand their benefits and what they have to offer individuals with ASD. The results also provided a lens through the professionals’ experiences into the classrooms by providing information from professionals that utilize and implement these systems daily including their successes in aiding communication effectively.

Keywords
Augmentative and alternative communication, Autism Spectrum Disorders, visual communication systems

Introduction
The American Psychiatric Association (2013) defines Autism Spectrum Disorder (ASD) as a neurodevelopmental disorder that is characterized by persistent difficulties in social interaction and communication (p. 50). The research on and diagnosis of ASD...
identifies, “communication difficulties [as] a core feature of autism” (Pinborough-Zimmerman et al., 2007, p. 360). The DSM-V describes the symptoms pertaining to social interaction and communication for individuals with ASD as experiencing deficits in social-emotional reciprocity or the failure to participate in a two-way conversation, as well as a display of nonverbal behaviors including a lack of understanding body language and the appropriate use of gestures (American Psychiatric Association, 2013, p. 50). The barriers or gaps in communication are often the cause of an individual’s failure or success in both academic and social experiences.

The development of language and communication skills typically occurs in conjunction with other aspects of child development (Lue, 2001). Crowley and Heyer (2016) describe the act of communication as, “an exchange of information and messages [which] is an activity” (p. 2). There are, however, several mediums through which an individual can communicate; talking and writing are just two methods of exchanging information. Since these skills are obtained during the early stages of an individual’s growth, it is important to implement an intervention for communication following the identification of the language delay as soon as possible. The communicative abilities of individuals with ASD are often quite varied, and the symptoms as such are manifested at a very young age (Ogletree & Oren, 2006). Consequently, there is a great need for different intervention methods due to the diverse and broad spectrum of communicative symptoms and delays present in each individual with ASD.

Augmentative and alternative communication (AAC) systems are characterized as any method of expressive or receptive communication that replaces or enriches spoken communication when conventional speech is not acquired. Ogletree and Oren (2006) explain that augmentative systems are implemented to supplement or enhance speech or writing; whereas, alternative methods are utilized when speech is characteristically delayed or may not be present. There are two separate types of AAC systems available to individuals with language delays and communication deficits. The first type of AAC system that does not require external assistance or equipment is classified as an unaided method which may include manual sign language and gestures. The second form is designated as an aided AAC system which utilizes external equipment such as computerized tools, communication boards, or pictures and cards with words on them that are exchanged during the functional communication processes with or without verbal output.

In an attempt to overcome communication difficulties, interventions such as the Picture Exchange System (PECS) which was developed with the hypothesis that visual communication systems can, “enhance the functional communication skills of individuals with ASD” (Tien, 2008, p. 74). Ewald and Lightfoot (2001) explain that, “photos can create moments of authentic collaboration” and that these types of experiences are essential to the acquisition and application of social communication (p. 119). Additional benefits exhibited from the use of photography are the enhancement of both creativity and imagination (Munakata & Vaidya, 2012), the development of visual literacy skills (Walter, Baller, & Kuntz, 2012), and an increased ability of critical thinking (Felten, 2008).

While there is a solid base of knowledge and research (Ogletree & Oren, 2006; Romski & Sevick, 2005; Wendt, 2009) pertaining to augmentative communication systems that utilize images, there are still some areas that have yet to be investigated. The perceptions of educational professionals who serve individuals with ASD is an integral aspect in the continuation of research regarding the effectiveness of visual communication systems and their applications for functional communication interventions. Due to the high importance to construct and maintain an effective source of communication for individuals with ASD research must include evaluating the effectiveness of the various AAC systems in the educational environment.

The main purpose of this study was to investigate educational professionals’ perceptions of the effectiveness of visual communication systems and their applications as functional communication interventions for students with ASD. Three research questions guided this study: Research question one asked: What are the perceptions of educational professionals who serve individuals with ASD as it relates to effective interventions for functional communication? Research question two asked: What are the perceptions of educational professionals who serve individuals with ASD as it relates to effective interventions for functional communication? Research question three asked: What are the perceptions of professionals who serve individuals with ASD as it relates to the effect of the individual being the creator of the pictures or photographs utilized in the communication systems?

Methodology

Participants

There were 101 participants in this study from diverse educational backgrounds, school districts, educational services, and various states. There were 80 females representing 79.21% of the participants and 20 males representing 19.08% of the participants. All participants were given the option to disclose or not disclose their
gender and one participant chose that option. There were five participants between the ages of 18 and 24; 36 participants between the ages of 25 and 34; 25 between the ages of 45 and 54; 23 participants between the ages of 35 and 44; 11 participants between the ages of 55 and 64 years old, and one participant was 65 years of age or older.

Overall 46 participants indicated that they obtained a master’s degree; 32 participants indicated that they held a bachelor’s degree and 23 participants indicated that they completed post graduate coursework. Twenty five participants had between five to nine years of teaching experience, 21 participants had between 10 and 14 years of teaching experience, and six participants had less than one to six years of teaching experience. Participants were also asked to identify their teaching certifications and were given the option of selecting more than one certification range. There were 101 participants and 197 varying responses. There were 96 participants in this study who held more than one certification. There were 85 participants who held a Teacher of Students with Disabilities (TSWD) teaching certificate. In terms of grade levels taught, 20% of the participants held teaching certifications for grades kindergarten through 12th; 16% of the participants held a certificate to teach students in grades kindergarten through fifth grade; 10% held a certification in preschool through third grade; 9% of the participants taught kindergarten through eighth grade and 1% held a Reading Specialist certification.

The participants teaching experience with individuals with ASD varied with 28% indicating that they had one to four years of experience teaching individuals with ASD; 22% indicating that they had one to four years of experience teaching individuals with ASD; 22% indicating that they had one to four years of experience teaching individuals with ASD; and 8% indicating that they had one year or less of experience working with individuals diagnosed with ASD (see Figure 1).

The types of classroom settings varied with 50% of the participants indicating they worked in a self-contained classroom setting; 35% indicating they worked in an inclusive setting; and 3% indicating they worked in a classroom setting that utilizes a team consisting of a teacher and a one-on-one paraprofessional.

Procedure

The study was conducted through an internet-based survey system, (Formsite) and was password-protected to ensure the confidentiality of the participants. The survey was distributed to participants through social media sources and email addresses listed in the public domain. All completed surveys were collected via Formsite where their results were recorded and saved. Each participant completed the electronic survey consisting of 78 Likert scale questions. A Likert scale measurement was used because the study was trying to capture the cognitive and affective components of the participants’ attitude.

There were 101 participants in the study, and 100% of the surveys were completed.

Once the participants’ responses were collected through Formsite, the data was analyzed. Each question in the survey was categorized into separate sections that corresponded to one of the three research questions. The results were calculated using a 5-point

![Figure 1. Teaching experience with individuals with ASD.](image)

ASD: Autism Spectrum Disorder.
Likert scale and were represented as percentages among the participant population. In order to gain a better understanding of professional educator’s backgrounds and their prior knowledge of AAC systems, a series of closed ended questions were posed prior to each of the sections.

Results

Participants’ backgrounds and prior knowledge of AAC systems revealed that 97% of the participants integrated technology into their daily instruction and 87% of the participants had a basic understanding of AACs systems. In regards to professional development and the use of AACs systems, 60% of the participants indicated that they sought professional development on the use of AACs, while 40% indicated that they did not. It is possible that the 40% may not be a direct reflection on the availability of professional development in this area because only 58% of the school districts according to respondents offered professional development in the use of these systems, while 41% did not.

Another series of closed ended questions were posed to gain information about the participants experience with a select few of the aided augmentative communication systems. The most popular and widely used was the PECS. The PECS system has two main formats a book system and computerized system. The utilization of one of these formats was used by 72% of the respondents who stated they incorporated at least one of these systems into their daily instruction and classroom activities. Voice output devices (VOCAS) such as Vantage were also utilized. The percentage of the participants who had experience implementing these systems was almost evenly split with 54% having experience, and 46% having limited or no experience. Experience with topic board systems yielded a similar result. The respondents were almost evenly split 50.4% to 49.5% among those who had experience with this system versus those who did not.

The final survey questions were centered on the area of photo journaling. Although 60% of the respondents were familiar with photo journaling, only 30% had actually used it or a similar method in the classroom. This last statistic may indicate that participants had the knowledge but lacked the experience or resources required to apply their system knowledge in their classroom. Although, these statistics provided some general insight into the participants and their knowledge of the varying communication systems, a more in depth investigation of the participants perceptions regarding these systems was yielded through a series of questions utilizing a 5-point Likert Scale.

The survey was broken into three main categories to correlate with each of the three categorical variables. The first categorical variable investigated the perceptions of professionals who served individuals with ASD as it relates to effective interventions for functional communication. Participants were first asked if aided augmentative systems (non-electronic or computer picture and text based) were more effective for those with ASD than unaided augmentative communication systems (gestures, pointing and sign language). The study found that 59% of the participants agreed that aided augmentative communication systems were more effective than unaided systems for individuals with ASD, while 19% of the participants disagreed that aided augmentative communication systems were more effective than unaided systems for individuals with ASD. These related to participants’ perception of aided systems as the more effective methodology for communication interventions. There was also an association when participants were asked about their perception of the effectiveness of a system for an individual and the age at which they were introduced to the intervention, with 64% agreeing with this question.

When participants were asked if specific types of pictures used in an aided augmentative communication system had a direct impact on the success of the behavioral objectives, 74% of the participants agreed, and 7% of the participants disagreed that specific types of pictures used in an aided augmentative communication system had a direct impact on the success of the behavioral objectives. The participants’ responses to this question illustrated that participants perceived that there was a direct impact on success as it related to functional communication being communicated via the images used in the aided augmentative communication systems. In terms of types of pictures used in an aided augmentative communication system having a direct impact on the failure of the behavioral objectives, 54% of the participants agreed that it did while 17% of the participants disagreed that the specific types of pictures used in an aided augmentative communication system had a direct impact on the failure of the behavioral objectives. This is important because it shows that most participants perceived that the images utilized in aided augmentative communication systems directly affect the failure of the behavioral objectives.

When asked about aided augmentative communication systems promoting functional skills by focusing on social behaviors 77% of participants agreed, while 4% of the participants disagreed that aided augmentative communication systems promoted social skills by focusing on social behaviors. A significant result was yielded when participants were asked about unaided augmentative communication systems not requiring individuals with ASD to possess multiple skill sets in order to perform, with 62% of participants’ agreeing,
while 13% of the participants disagreed. These results demonstrate that participants agree that in order for an individual to properly utilize and succeed with an unaided augmentative communication intervention such as American Sign Language, the individual must possess control of their fine motor skills.

When queried about individuals with ASD having challenges with fine motor skills, with 67% of participants perceived that aided augmentative communication systems were utilized more frequently while 6% of the participants perceived that aided augmentative communication systems were not utilized more frequently. Participants were also asked if unaided augmentative communication systems alone gave individuals with ASD the skills necessary to increase functional communication and 26% of participants perceived they did, while 56% of the participants perceived that unaided augmentative communication systems alone did not give individuals with autism the skills necessary to increase functional communication. When queried about their perceptions of aided augmentative communication systems limiting an individual’s potential to communicate independently, with 64% of the participants disagreed that aided augmentative communication systems limited an individual’s potential to communicate independently. In contrast 51% of the participants agreed that unaided augmentative communication systems enhanced an individual’s potential to communicate independently.

In terms of aided augmentative communication systems being effectively implemented in an inclusive classroom setting, 75% of participants perceived this could be effectively accomplished, while 2% of the participants perceived that aided augmentative communication systems could not be effectively implemented into an inclusive classroom setting. Forty seven percent of the participants agreed unaided augmentative communication systems were more challenging to implement into an inclusive classroom setting, whereas 29% of participants disagreed that unaided augmentative communication systems were more challenging to implement into an inclusive classroom setting.

A result of 81% was found when participants were asked if aided augmentative communication systems promoted social communication between the individual with ASD and the other students within the classroom, with only 3% of participants disagreeing. Similarly, when participants were asked if aided augmentative communication systems promoted social communication and interactions through the use of commonly understood pictures, 83% of participants perceived that it did, while 2% did not. The majority of participants, 86% agreed that a combination of unaided and aided augmentative communication systems allowed for several layers of understanding of the individual’s wants or needs.

When participants were asked if aided augmentative communication systems foster functional skills and interaction due to the scaffolding of the systems, 81% perceived that they did. Also, 77% of participants perceived that aided augmentative communication systems were a foundation to functional communication interventions. In terms of unaided augmentative communication systems, such as sign language being challenging for social situations when an effective translator was not present, 74% of participants agreed. Furthermore, 62% of participants agreed that aided augmentative communication systems encouraged verbal speech necessary for functional communication and another 63% of the participants, agreed that aided augmentative communication systems fostered more advanced levels of functional communication skills than unaided augmentative communication systems.

The second categorical variable intended to investigate the perceptions of educational professionals who served individuals with ASD in regards to the effectiveness of computer-based augmented communication systems verses paper or board communication systems. This section of the survey focused on inquiring if low tech aided augmentative communication systems such as PECS were more effective for students with ASD than high tech systems such as voice output systems that were strictly computer based. When comparing the effects of low tech aided augmentative communication systems such as PECS for those with ASD and high tech systems such as voice output systems, 22% of participants perceived low tech aided augmentative communication systems were more effective than high tech system, while 45% of the participants disagreed that low tech aided augmentative communication systems such as PECS were more effective than high tech systems such as voice output systems. However, 32% of the participants agreed that low tech aided augmentative communication systems were more effective as they were easier to utilize, while 36% of the participants, disagreed that low tech aided augmentative communication systems were more effective as they were easier to utilize.

A low result was found when participants were asked if high tech aided augmentative communication systems were less effective as they were slower to implement. The study found that 15% of participants agreed that high tech aided augmentative communication systems were less effective as they were slower to implement, while 36% of participants disagreed. On the other hand, 46% of participants agreed that low tech aided augmentative communication systems were more effective in the possible acquisition of functional communication while 20% disagreed that low tech aided
augmentative communication systems were more effective in the possible acquisition of social communication. In terms of high tech aided augmentative communication systems being more effective in the possible acquisition of functional communication, 49% agreed and 21% disagreed. When asked about verbal communication acquisition, 44% of the participants agreed that high tech aided augmentative communication systems were more effective in the possible acquisition of verbal communication, whereas, 22% disagreed that high tech aided augmentative communication systems were more effective in the possible acquisition of verbal communication. In contrast, 38% of the participants agreed that low tech aided augmentative communication systems were more effective in the possible acquisition of verbal communication, while 24% disagreed that low tech aided augmentative communication systems were more effective in the possible acquisition of verbal communication. When participants were asked if alphabet board systems were an effective method of communication in social settings and situations, 50% perceived that they were effective, while 29% perceived that they were not.

When asked if low tech aided augmentative communication systems such as the Picture Exchange Communication System were easier to implement into a student’s everyday routine, 47% perceived it as easier, while 29% perceived it as less easy. When it came to cost effectiveness, 53% perceived that low tech aided augmentative communication systems such as a topic board system made with Velcro were more cost effective to implement into a student’s everyday routine, while 18% perceived low tech aided augmentative communication systems such as a topic board system made with Velcro® were not more cost effective to implement into a student’s everyday routine. Another low tech aided augmentative communication system surveyed was the flash card communication system. Participants were asked if this was an effective method of communication in social settings and situations and 30% perceived it as an effective method while 43% did not perceive it as an effective method. Similarly, participants were asked if alphabet board systems were an effective method of communication in social settings and situations and 42% perceived they were not, while 29% perceived they were.

Participants did perceive, 36%, that topic board systems were an effective method of communication in social settings and situations. However, 32% did not perceive that topic board systems were an effective method of communication in social settings and situations. Fifty percent of participants perceived that voice output systems (VOCAS) such as Vantage were a more effective method of communication in social settings and situations while 14% perceived that voice output systems (VOCAS) such as Vantage were not a more effective method of communication in social settings and situations. When asked about the practicality of the PECS in book and Velcro® form versus its computerized application, 45% of participants perceived it as less practical, while 25% perceived it as more practical. When asked if the PECS in its computerized form was more effective for functional communication, 48% perceived it as more effective, while 11% perceived it as less effective.

The final research question focused on the perceptions of professionals who served individuals with ASD as it related to the effect of the individual being the creator of the pictures or photographs utilized in the communication systems. A finding of 70% was yielded when participants were asked if individuals with ASD responded more positively with communication systems which utilized photographs versus those that did not. On the contrary, 7% of the participants disagreed that individuals with ASD responded more positively with communication systems which utilized photographs versus those that do not. When a type of communication system, such as clip art was added to the question, 36% of participants agreed that individuals with ASD responded more positively with communication systems which utilized clip art pictures verses those that did not, whereas 30% disagreed.

Similar results were yielded when the question was posed about communication systems which utilized Mayer-Johnson symbols versus those that did not, with 27% agreeing that individuals with ASD responded more positively with communication systems which utilized Mayer-Johnson symbols. When asked if individuals with ASD were more actively engaged in the functional communication process when they were given the opportunity to produce a drawing in relation to the topic, 63% perceived that they were versus 13% who perceived they were not. Furthermore, 52% of the participants perceived that drawings created by the individual assisted in increasing their desire to communicate with others, while 16% perceived that drawings created by the individual did not assist in increasing their desire to communicate with others. Also 56% of the participants perceived that drawings produced by the individual with ASD provided a personal connection to the communicative process, while 12% perceived they did not. Similarly, 67% of the participants perceived that photographs taken by the individual with ASD also increased the desire to communicate with others, while 11% perceived that they did not. When participants were asked if photographs taken by the individual with ASD provided a personal connection to the communicative process, with 72% perceived that they did, while 7% perceived that they did not.
When participants were asked if photo journaling had positive applications to functional communication interventions, 75% of the participants perceived that it did, while 3% perceived that it did not. Also 74% of the participants agreed that photo journaling allowed individuals with ASD a positive emotional outlet for communication while 1% perceived that it did not. Finally, 79% of the participants agreed that photo journaling provided individuals with ASD an artistic outlet for communication.

When asked if they perceived that photo journaling could be implemented into an inclusion classroom, 75% of the participants perceived that it could, while 1% perceived that it could not. Along those same lines, 75% of the participants agreed that photo journaling could be beneficial to all students in an inclusion classroom, while 2% disagreed. Also 78% of the participants agreed that photography was an instrument that allowed students with communication disorders to describe themselves to others while 2% disagreed. Overall 56% of the participants agreed that individuals with ASD who were given the opportunity to utilize photographs and/or drawings had better functional communication skills than those who were not exposed to these types of communication strategies.

When participants were asked if individuals with ASD, that were non-verbal, could use photography to express themselves effectively via photo journaling, 75% of participants perceived that they could, while 2% perceived they could not. Also 63% of the participants agreed individuals with ASD that were non-verbal, could use photography to express themselves using the Photovoice technology, while 1% disagreed. Overall, a result of 80% was yielded when participants were asked if the use of pictures and visual instruction empowered students to engage in a larger range of subjects, while 4% disagreed. In terms of teachers in an inclusion classroom setting perceiving that students were more engaged with individuals with ASD when the individual communicated with pictures, 67% of the participants agreed, while 4% disagreed. Also 63% of the participants agreed that teachers in an inclusion classroom setting perceived that the use of pictures removed the language barriers between students with and without autism, while 7% disagreed.

Discussion

The findings from this study indicated that professionals who serve individuals with ASD regarded aided augmentative systems as being more effective for individuals with ASD than unaided augmentative communication systems. Unaided AAC systems may be effective for some individuals however; those methods required the individual to possess total control of their fine motor skills in order to be successful (Charlop, Greenberg, & Chang, 2011; Mirenda & Erickson, 2000; Ogletree & Oren, 2006; Seal & Bonvillian, 1997). While unaided AAC systems can be utilized for communication intervention purposes for those diagnosed with ASD, the majority of participants perceived that unaided AAC systems alone did not possess the necessary means to increase functional communication skills (Seal & Bonvillian, 1997). Due to the scaffolding of aided AAC systems such as PECS, participants also agreed that the potential of having the individuals with ASD communicate independently increased (Millar, Light, & Schlosser, 2006).

This study also found that aided AAC systems were more widely utilized than unaided AAC systems with individuals who have been diagnosed with ASD, which could be due to the availability of their various approaches. The selection and exchanging of images through several different mediums including computerized and/or physical means allowed for a wide variety of methods to help individualized programs better align with specific needs in order to achieve the effective results for the individual. Participants also perceived that aided AAC systems needed to be introduced as early as possible since there was a association between the age and the introduction of the system in relation to it being effective. This concurred with there being a high importance to introduce these systems to the individuals as early as possible to achieve the best outcomes (Hall, 2013).

Participants indicated that there was a high importance in regard to the types of images utilized in these systems as they have a direct impact on the effectiveness of achieving the behavioral objectives set for the individual. The visual representations of words must be universally understandable to alleviate confusion during the communicative process. Added stressors such as frustration due to a lack of understanding can lead to negative behavioral outcomes. Participants indicated that aided AAC systems promoted communication for social purposes. These systems promoted skills through the use of images that included people and emotions; this could increase functional communication and give individuals with ASD opportunities to communicate more independently (Dyrbjerg, Vedel, & Pedersen, 2007). It may also be useful in increasing skills that easily could be incorporated into an inclusion classroom setting.

Participants who served individuals with ASD overwhelmingly concluded that aided AAC systems could be effectively implemented into an inclusive classroom setting. The universality of aided AAC intervention allowed for all parties to collaborate in the classroom even at different communicative levels (Ganz, Lashley, & Rispoli, 2010). Participants agreed that while
unaided AAC systems were an option in the classroom, use of them presented communicative barriers when a translator was not present, whereas, aided AAC systems in many cases were universally and easily understood which aided in peer communication.

The second objective of this study was to determine the perceptions of professionals who served individuals with ASD in regards to the effectiveness of computer-based augmented communication systems verses paper or board communication systems. The overall participants' perception results were split in regard to low tech versus high tech AAC systems being effective. The causality of these results could be attributed to the broad variety of the different systems and to the participants' experiences. It could also be attributed to individuals with ASD sharing similar characteristics of the diagnosis of autism; however, symptoms are on a spectrum making each case distinct.

Results also indicated that participants agreed that a combination of both low and high tech methods such as the computerized and board versions of PECS may be more effective as each system can be utilized in different settings. Therefore, the split perceptions among the participants could also be attributed to the theory that the selection of a low or high tech AAC intervention depends on the needs specifically required by the individual using the system. Participants did agree; however, that regardless of the level of technology selected for the individual; the program was more effective when the individual was provided with the intervention as early as possible (Romski & Sevcik, 2005).

Further examination of the participants' perceptions did indicate that there were advantages to low tech aided AAC systems. These types of aided AAC systems can be constructed with Velcro® which, is more cost effective to implement into an individual’s everyday routine in both academic and nonacademic environments. These types of aided AAC systems are easily created, portable, durable and replaceable material (Ganz et al., 2010). Participants did however; indicate that flash card and alphabet board systems were less effective for communicative needs in social settings. The general consensus provided by the participants was that more simplistic systems such as the computerized (app for phones and tables) forms of PECS and voice output devices such as Vantage were more effective and practical for social communication situations (Tien, 2008).

The final objective of the study was to ascertain the perceptions of professionals who served individuals with ASD regarding the effect of the individual being the creator of the pictures or photographs utilized in the communication system. Participant responses in this section of the survey indicated that the inclusion or use of photographs and photography could be used to improve social communication with individuals diagnosed with ASD. However, many of the participants did indicate that they were unfamiliar with the concept of photo journaling or did not have prior knowledge of this technique. The preference of the different types of images utilized in the communication systems was mainly digital photographs and Mayer-Johnson symbols. While clip art images were also an option, the participants’ responses were stronger in the photograph and Mayer-Johnson symbols sections. The incorporation and inclusion of the individual taking on an active role in the creation of the images that corresponds to the lesson or conversation has proven to be an effective technique (Kantor, 2008). This process assists in gaining and keeping the individual actively engaged in the related topic making the material more memorable (Carpino, Ugalde, & Gow, 2014).

The participants indicated that photo journaling may provide individuals with ASD an emotional and artistic outlet for expression of their thoughts and ideas to others in a positive manner (Pierce & Schreibman, 1994). Participants were also in favor of photography having positive applications for social communication opportunities as individuals with ASD were given a new medium that empowered them to communicate with others (Mayberry, 2000). When an individual was given the tools to communicate with not only their teachers, but also their peers a stronger social connection could be forged. Breaking down communication barriers between students can be challenging when there was a lack of interest in communication. Participants found that the use of images may help to relieve some challenges as photographs can be used to initiate conversation and expand the individual’s interest in a larger range of subjects. Through the incorporation of images that corresponded to verbal instruction, visual representations can support the effectiveness of the lesson by making it personal and memorable for students (Kantor, 2008). Participants agreed that photo journaling cannot only be implemented into an inclusive classroom setting, but also be beneficial to all of the students in that setting (Dyrbjerg et al., 2007).

**Limitations and recommendations**

Although the results of this study proved significant in providing further information in to the effectiveness of AAC systems for individuals with ASD, there were some limitations to the study. First, due to time constraints, the size of the participant sample could have been larger and more expansive given a longer time line for recruiting participants. In order to rectify this limitation, the recruitment period could be extended to gain a larger participant population. A direct
reflection and limitation of the instrument utilized to survey the participants lies within the instrument itself as some potential participants indicated that the length of the survey was too extensive and they were unable to dedicate enough time to participate. Future research may choose to shorten the instrument into a more concise form that still encompasses the required content.

Since the survey was shared across social media there was a possibility that a contributor who responded was not a part of the targeted participant population. In order to eliminate this limitation, future researchers could recruit exclusively through educational establishments that served individuals diagnosed with ASD; thereby, lessening the chance of unreliable responses. Limitations of the relevancy of the results may have also occurred as a portion of the participants were unfamiliar with photo journaling, as well as augmented and alternative communication systems even though all of the participants had indicated a level of experience working with individuals with ASD. There is a lack of empirical studies regarding photo journaling and individuals with ASD and their impact socially and academically. Research regarding photo journaling and its applications to serve those with ASD are not as prevalent as AAC systems.

The studies and sources included were selected due to their recent publication, content and evidence presented. Systems such as PECS and VOCAS have been incorporated into classroom curriculums for over a decade and were chosen for discussion due to the amount of information that could be attained on each. Therefore, several AAC systems were not discussed in the interest of keeping information more concise and current.

**Conclusion and implications for future research**

The main purpose of this study was to investigate educational professionals’ perceptions of the effectiveness of visual communication systems and their applications as functional communication interventions for students with ASD. The results revealed that the overall consensus of educational professionals that serve individuals with ASD agreed that aided AAC systems were more effective in the field as AAC systems are numerous. Research data encountered during the literature review did not provide research conducted or presented by professionals working with students in classrooms. The purpose of this inquiry of professionals was to gain a better understanding of what the professionals utilizing these systems have or have not experienced as effective in the field as AAC systems are numerous.

**Declaration of conflicting interests**

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

**Funding**

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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