Literature Review on the Effectiveness of
Augmentative and Alternative Communication Tools

by

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Dedication

To my parents who have supported and encouraged me throughout the years. Thank you for always being by my side and for helping me to become a more confident person.

To my friends who have supported and encouraged me these past four years at St. Lawrence College. Thank you for the fun-filled moments and laughter.
Abstract

Over the years augmentative and alternative communication (AAC) devices have been used with various disorders and disabilities that affect speech. The purpose of this thesis is to investigate the research that examined the effectiveness of AAC methods to increase communication skills in adults with developmental disabilities. Peer-reviewed articles were gathered from online databases accessible to St. Lawrence College. Articles that were relevant to the thesis were chosen, and the method and results sections were summarized in a table. The literature conveys that AAC is effective with various populations such as people with aphasia, autism spectrum disorder, intellectual disabilities, and developmental disabilities. Moreover, it was discovered that important factors such as motor ability and language comprehension need to be considered when choosing an appropriate AAC device to use. For future research it is recommended that studies need to have more clinical data on AAC with adults who have developmental disabilities. Also, more research needs to be conducted on the barriers that agencies and families may face in regards to using AAC.
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Chapter I – Introduction

Throughout the world, people communicate with each other in some form or another. A quote by Bob Williams as cited in Beukelman and Mirenda (2013) stated, “We all need to communicate and connect with each other-not just in one way, but also in as many ways possible. It is a basic human need, a basic human right” (p. 203). This need to communicate is evident in our world today. Our society has developed various forms of communication throughout the centuries such as stories, letters, books, art, music, telephones, email, social media, and texting among others. By communicating, people can express their needs and wants, while they engage with others.

While people’s main form of communication is typically through the use of speech, 1.3% of all people cannot depend on verbal language, and as a result, their communication needs are not met (Beukelman & Mirenda, 2013). People who have trouble speaking or cannot speak have to rely on other means of communication, which is where augmentative and alternative communication (AAC) becomes important. The American Speech-Language-Hearing Association as cited in Beukelman and Mirenda (2013) defined AAC as developing technology or alternative methods to help people develop or regain the ability to communicate. Using AAC can help people who have developmental disabilities gain the ability to communicate for the first time. Some developmental disabilities that can affect a person’s speech are cerebral palsy, intellectual disabilities, autism spectrum disorders (ASD), deaf-blindness, and childhood apraxia of speech (Beukelman & Mirenda, 2013).

AAC methods can help individuals with developmental disabilities communicate if they are unable to do so verbally or through writing. The three common AAC methods used are manual signing (MS), picture exchange (PE), and speech-generating devices (SGD). MS, another term for sign language, is defined as using hands, body language, gestures, and facial expressions to communicate with other people (Research Autism, 2016). These sign languages can include American Sign Language, British Sign Language, and Makaton (Research Autism, 2016). PE, also known as picture exchange communication system, is defined as showing a person a picture on a card as a form of communication (Research Autism, 2016). A SGD, known as a voice output communication aid, is a type of electronic device, which allows a person to speak (Research Autism, 2016). Hamm and Mirenda (2006) found that even though youth with limited communication skills had access to AAC interventions during childhood, these services diminished when they became adults.

Over the years, researchers have developed various forms of technology and methods to provide alternative forms of communication. With the numerous developments in this field it can be difficult to know which AAC method is most effective for an individual. By identifying which AAC technique would be the most effective for individuals with developmental disabilities, their interactions with others could be enhanced (Beukelman & Mirenda, 2013).

The aim of this literature review is to compare and contrast research on the effectiveness of AAC methods. This literature review is composed of five main sections: effectiveness of non-aided approaches, effectiveness of aided approaches, effectiveness when comparing two AAC methods, effectiveness of comparing three or more methods, and factors to consider when
selecting an AAC method. The overall goal is to examine the literature on the types of AAC devices used with people who have developmental disabilities in order to determine the effectiveness of the AAC methods. If there is difficulty knowing which AAC method to use, the literature review may improve the decision-making process for which methods would be the most effective to use with adults who have developmental disabilities.

Overall, the thesis consisted of five parts: Introduction, Literature Review, Method, Results, and Discussion. The Introduction provided an overview on AAC and presented the thesis statement. The next section is the Literature Review which is composed of a description and the history of AAC, the effectiveness of AAC, and the factors to consider when choosing an AAC method. The Method outlined the process of finding the research through a search of journal articles, book chapters, and government websites. The Results section contained a summary of the main findings from the reviewed research. Finally, the Discussion described the implications of the research, provided recommendations to the agency, and discussed the strengths and limitations of the thesis.
Chapter II - Literature Review

AAC has been used since the 1970s when MS was first introduced (Mirenda & Iacono, 2009). There are a variety of AAC methods which can fit under two categories: unaided communication systems and aided communication systems. Unaided communication systems mean the person relies on his or her body to communicate (American Speaking and Hearing Association [ASHA], 2016). These include sign language, gestures, body language, and manual signs. Unaided AAC methods were used for many years, especially MS before PE and SGDs were introduced. Aided communication systems require a person to rely on technology or other methods to help communicate messages (ASHA, 2016). These methods can include strategies from writing to non-electronic communication boards to using SGDs. The main populations that use AAC are people who have disabilities or disorders that inhibit their ability to communicate on some level. The most common types include people with cerebral palsy, aphasia, acquired brain injury, autism, and many more. No matter the severity the disability has on a person’s communication skills, AAC enables people to communicate.

Effectiveness of Non-Aided Approaches

Manual Signing.

Manual sign systems were one of the first AAC methods developed; and they were originally made for people who were deaf (Beukelman & Mirenda, 2013). However, MS has also been used with people who have autism or intellectual disabilities, and even with individuals with childhood apraxia of speech (Beukelman & Mirenda, 2013).

Grove, O’Sullivan, and Rodda (1979) conducted a study to determine whether total methods were more effective than oral methods by testing which group had the most correct scores. They defined total methods as a combination of speech, lip reading, and manual signing, while oral methods consisted of speech and lip reading. The participants, adolescents who were severely deaf, had to choose one of eight pictures that best matched the message the researchers provided (Grove, O’Sullivan, & Rodda, 1979). The researchers conveyed the message through the participants’ preferred method of communication: speech, MS, fingerspelling, or any combination of these methods. Grove et al. found that using a combination of methods were just as effective as the oral methods when they used the participants’ preferred method of communication.

Schuebel and Lalli (1992) implemented a program to help increase MS skills in an adult who was non-verbal. They used a program that involved modeling, prompts, positive reinforcement, and natural reinforcement to teach the adult to manually sign the items needed for the bathroom routine. In other words, the instructor only provided prompts if the participant did not respond with manual signing within 10 seconds when the request was given. The researchers found that the program helped increase the adult’s MS skills and the ability to quickly learn new signs. The adult also generalized the MS skills to different staff members and other items.

Overall, the two studies showed that MS can be used with people who have complex communication needs, not just people who are deaf. Even though there were a few studies on MS alone, some of these studies showed that MS could be effective when teaching individuals...
who are non-verbal, especially those who are deaf. One common limitation found in both of these studies is the small number of participants ranging from 1 to 26. The results were not statistically significant, so people can view these results with caution. The studies were published in the 1970s and early 1990s, which made the studies not relevant to this era. The field of AAC has advanced in many ways since the 1980s, so future studies need to compare manual signing with other AAC methods.

**Effectiveness of Aided Approaches**

**Visual scene displays.**

There are many types of aided AAC devices and methods such as PE and SGDs. A new type of technology that has been recently employed in the AAC field is visual scene displays (VSDs), used mostly by people who have aphasia. Aphasia is a type of communication disorder with both receptive and expressive components in which people have trouble speaking due to brain damage (ASHA, 2016). For this section of the literature review, the focus was on the expressive components for people with aphasia. VSDs use personal photographs in conjunction with text to help with storytelling (Dietz, Weissling, Griffith, McKelvey, & Macke, 2014). Griffith, Dietz, and Weissling (2014) examined the types of AAC on improving storytelling in people who have aphasia. The researchers created four types of interfaces on VSDs, which consisted of personal photographs with and without textboxes, and line drawings with and without textboxes. They analyzed the stories to describe what expressive modality units were used. In other words, Griffith et al. analyzed the way that the participants told their stories. Griffith et al. found that the adults with aphasia used mainly speech to tell their stories. They also found that personal photographs were used more than line drawings; however both of these visual aids were equally helpful. Griffith et al. discovered that the participants preferred to have textboxes or write to go alongside the personal photographs. This study also investigated communication barriers such as communication breakdowns or if the device needed any repairs. The researchers found that the subjects experienced low rates of communication breakdowns despite the type of VSD they used. The researchers concluded that conducting future individual assessments is important to find the proper amount of AAC supports for people who have aphasia.

In a later study, Dietz, Weissling, Griffith, McKelvey, and Macke (2014) investigated the presence of communication barriers in people who have chronic aphasia when they told their stories using VSDs to an unfamiliar person. One of the researchers analyzed each of the participants’ conversations to determine what expressive modality they used. The participants could express their stories by speaking, writing, drawing, using personally relevant pictures, textboxes, or a speak button. This study was similar to research by Griffith et al. in that similar components were used such as the types of expressive modalities used were analyzed and communication barriers were investigated. Dietz et al. (2014) came to similar findings as Griffith et al. (2014) in the study. For example, the participants found that using personal photographs and text was helpful in the re-telling of stories. The researchers also found that the participants did not experience any barriers when re-telling their stories with VSDs while using personal photographs and textboxes. In the study, pictures and text were separate entities. One common limitation found in the two studies was the small number of participants and lack of generalization. These components signified that the results were not statistically significant.
Overall, Dietz et al. concluded that these findings would be beneficial for future investigations when determining how the interface design helps people who have aphasia to communicate.

Moreover, Ganz, Hong, Gilliland, Morin, and Svenkerud (2015) compared VSDs with exchange-based communication in two preschool children diagnosed with ASD. They investigated the effect that VSDs and exchange-based communication had on the children’s communication skills. Ganz et al. alternated between the VSD, which was a program on a tablet called GoTalk Now Plus, and a communication book used for exchange-based communication. The researchers read one page at a time in a book and allowed the subjects to make comments and answer questions either verbally or using an AAC method. One child used the VSD more often to communicate to one of the researchers, while the other rarely used the VSD or the communication book. These differences between the boys’ responses could be due to individual differences such as prior experience with AAC devices, or the severity of the ASD. This study was different from the other two studies mentioned previously by examining the effectiveness of VSDs on children who have ASD and not using VSDs as an intervention. Ganz et al.’s study demonstrated the importance of studying other populations to determine if VSD could be effective in improving speech. The common finding that this study shared with the previous studies was the small number of participants, which caused the results to not be statistically significant.

Overall, the few studies available on the effectiveness of VSDs showed promise for improving communication skills in people who have aphasia. Further studies should be conducted to determine if VSDs could be effective with other populations.

**Tablets.**

In the rapidly developing field of technology, one type of SGD device that was invented was tablets. This type of device can accommodate many programs that people can use to help assist them with communication. McNaughton and Light (2013) noted that there were many benefits to using a tablet such as increasing social acceptance, becoming aware of AAC technology, and functioning at a higher level.

Waddington et al. (2014) taught three children with ASD to request to play with toys using an SGD. The purpose was to test the effectiveness of using an SGD to teach a three-step procedure. The researchers used a program on a tablet to teach the children a three-step procedure: to ask for access to toys, verbalize a specific request to choose a toy, followed by thank-you upon receipt of the toys. Waddington et al. found that all three children showed improvement in performing the three-step procedure. They found that the subjects performed step two more successfully than steps one and three. The participants generalized the procedure to a new communication partner, which showed the success the participants experienced when learning the three-step procedure using an SGD. A communication partner is someone that a person can use AAC with. This study provided further support in using tablets as AAC interventions though the results were not statistically significant due to the small sample size.

Roche et al. (2014) examined an SGD to increase speech production with two boys who had a neurodevelopmental disorder. Through the use of a program on a tablet, the boys were taught to ask for preferred items such as a colouring book. When using the SGD, the researchers
noticed that the boys began to utter single words relevant to their request. Throughout the intervention, the researchers removed the SGD in order to encourage natural speech when requesting objects. Overall, both boys learned to use the program to request preferred objects and they continued to respond more frequently with natural speech when the program was removed. This study was similar to Waddington et al.’s study (2014) by teaching requesting skills through the use of a tablet. The researchers’ findings was consistent with Waddington et al. in that using systematic instructions along with a tablet was effective in increasing communication skills. This study was different from Waddington and other previous studies in the field of AAC by being the first study to withdraw the SGD to increase natural speech in the participants.

Meer et al. (2015) used an iPad-based intervention to increase picture and word matching skills combined with graduated guidance and differential reinforcement in a student with ASD. They used a multiple baseline design across four matching tasks. The four matching tasks consisted of picture-to-picture, picture-to-word, word-to-picture, and word-to-word. Meer et al. requested that the student identify on the tablet the item that was presented on a picture. For example, if the card showed a picture of a horse, the participant would press the word horse on the tablet. The authors found that using an SGD was effective in increasing academic skills in a student with ASD. Despite the increase in academic skills, Meer et al. did not test for generalization or whether the intervention helped with the boy’s production of speech since the boy was not required to display any vocalizations. This study was different from the previous two studies by focusing on increasing academic skills rather than communication skills. The one common finding was the small number of participants, which made the results not statistically significant.

The effectiveness of using an application on a tablet was investigated with a student who had cerebral palsy and autism (Desai, Chow, Mumford, Hotze, & Chau, 2014). Desai, Chow, Mumford, Hotze, and Chau (2014) trained key people such as the student, the parents, and the teachers on using the program. The student used a program on an iPad to request for items and activities. The researchers found that the student’s communication skills increased during the school year. They concluded that implementing AAC devices in the classroom is essential for individuals who have a variety of communication needs. Even with the importance of using AAC devices in the classroom, the devices could be used in all settings for people who require the technology. The programs on these devices were found to be effective with children who have ASD, but there were few studies on the effectiveness of these programs on adults who have developmental disabilities. With the success these programs had with children, the programs would most likely be beneficial for increasing skills in adults who have developmental disabilities. Previous studies have trained only people with developmental disabilities on how to use AAC devices. However, in this study, Desai et al. (2014) trained other key people such as parents and teachers; this may be a potential factor of why this study was effective. They wanted future studies to investigate the use of peers in helping people who have developmental disabilities to communicate using AAC.

Overall, using SGDs, such as VSDs, and programs on a tablet can be effective in increasing communication skills in people who have developmental disabilities. With the effectiveness of a variety of AAC devices and programs, it is vital to conduct individual
assessments to determine which AAC method would maximize the potential in the person using AAC.

**Effectiveness of AAC when Comparing Two Methods at a Time**

With all of the communication assistance tools that are available for people, the question of determining which type of method is the most effective still remains. In one study, Stasolla et al. (2014) investigated the effectiveness of PECS and vocal output communication aids (VOCA) on increasing communication skills in three participants with Rett syndrome. Rett syndrome is a neurodevelopmental disorder that affects the X chromosome (Stasolla et al., 2014). Stasolla et al. used an alternating treatment design for PECS and VOCA. PECS involved using pictures to exchange for an item that the participants wanted, whereas VOCA entailed using a keyboard that produced sound when the participants pressed a button. Both AAC methods were found to be effective in increasing communication skills and decreasing stereotypical behaviours (Stasolla et al., 2014). However, when the researchers conducted a preference check, the participants preferred the SGDs compared to the PECS. Due to the small number of participants and lack of generalization, the results were not statistically significant.

Cannella-Malone, Fant, and Tullis (2010) investigated the effectiveness of PECS to increase social communication skills in two females with severe developmental delays. The authors conducted a multiple baseline study across social behaviours such as greetings, requests, and responses in order to evaluate the effectiveness of the PECS system. The results showed that using PECS was effective in increasing social skills and verbal communication skills (Cannella-Malone, Fant, & Tullis, 2010). The main difference between this article and the rest of the studies in the AAC field was using peers to teach individuals with severe developmental disabilities how to use social skills. The common finding with the previous study mentioned above was that the results were not statistically significant and there was a lack of generalization because of the small number of participants.

Meer et al. (2012) compared a SGD and manual signing in four children who had developmental disabilities. The authors’ purpose was to examine the effectiveness of these AAC methods to increase requesting for preferred objects such as I want a snack, and I want to play. They used an alternating treatments design by switching between the SGD and MS. The SGD was a program on a tablet, and the MS was the Makaton Sign Language. The results showed that all four children learned how to use the SGD, but three children learned how to use MS (Meer et al., 2012). Meer et al. (2012) found that three children preferred using the SGD, in this case an iPad, while the other child preferred MS. The authors confirmed the findings of other studies, which was that a majority of people who had developmental disabilities showed a preference for using SGDs. This study shared similar components with Stasolla et al.’s (2014) study through the use of an alternating treatment design though Meer et al. compared SGDs and MS instead of SGDs and PE. Meer et al. also came to similar findings, which was that the participants preferred SGDs over MS. The reasons for this could be that MS is more difficult to teach and it takes more memory to remember the signs.

Overall, these studies showed the effectiveness of a variety of AAC methods such as PECS and SGDs in various populations. With the success these methods had with people who
have developmental disabilities, it stressed the importance of using individual assessments to investigate what methods would be the best fit for people who use AAC.

**Effectiveness of AAC When Comparing Three Methods**

Over the years, researchers had conducted studies on MS, PE, and SGDs, which were three broad categories in the field of AAC. Achmadi et al. (2014) taught four boys with a developmental disability, or delay, to ask if they could continue to play with their toys using MS, PE, and a SGD. The researchers wanted to determine how quickly the boys learned each method. For each session, Achmadi et al. would allow the children to play with the toys for one minute. Afterwards, the researchers would remove the access to toys and place one of the three AAC devices on the floor. They taught the children how to use the three methods using graduated guidance. Achmadi et al. used the sign *more* for the Makaton Sign Language (MS), a symbol on a piece of paper (PE), and a program on a tablet (SGD). They used an alternating treatments design that consisted of baseline, intervention, post-intervention, and follow-up. The results showed that three of the boys learned to use all three options while the fourth boy learned to use only the PE. The researchers also found that the boys’ performance levels were best when using an SGD or the PE, and the preference of the SGD was noted as well.

McLay et al. (2015) conducted a similar study to Achmadi et al. (2014) by studying how quickly four children with ASD could learn the same three AAC methods. They completed an alternating treatments design where the children learned one method at a time, and the authors assessed the rate the children learned each method. The authors removed the box of toys and the children requested for more playtime using the AAC method provided. If the children used the AAC correctly, the authors gave back the box of toys. If not, the authors used least to most prompting. The authors found that maintenance was greater with the PE and the SGD, and the children preferred the SGD over PE and MS. The researchers also discovered that two of the children displayed generalization across people and settings with PE and SGD while one child showed generalization with all three AAC options. These findings were similar to what Achmadi et al. (2014) discovered in the previous study. The only difference was that McLay et al. (2015) added a generalization component.

Achmadi et al. (2015) conducted a study to discover personal opinions on MS, PE, and SGDs. The researchers showed a video clip of a person using three AAC methods and the subjects (undergraduates) had to evaluate each method under four categories: intelligibility, ease of acquisition, effectiveness/acceptability, and preference. Achmadi et al. found that perceived intelligibility and the effectiveness of the method were significantly higher for the SGD. The people also preferred either the SGD or MS to PE, although PE had higher significance on ease of learning. Overall, the researchers concluded that the SGD had the greatest social validity of the three AAC methods. This study was different from the previous two studies by investigating the social validity of AAC methods.

In summary, each of these studies demonstrated that using AAC was effective in helping individuals who had severe communication impairments. These studies also confirmed the importance of conducting individual assessments, because the AAC methods have been shown to be effective in increasing various skills such as communication and requesting. Determining the
effectiveness is crucial to finding which AAC method would maximize the potential benefits of individuals with severe communication impairments.

Factors to Consider When Selecting an AAC Method/Device:

There are many factors to consider when deciding which tool would be the most effective. Intrinsic factors are important to consider and can include impairments in the areas of physical, visual, auditory, language comprehension, speech, and cognitive processes (Smith, 2005). These intrinsic factors are important to examine because they can assess the person’s ability to read, write, and speak. By assessing these abilities, information can be gathered to design appropriate AAC interventions that would be the most beneficial for an individual. For example, by assessing vision and hearing, professionals can determine the types of symbols (pictures) and speech (synthetic or digitized) to use as part of the AAC method. In contrast, certain external factors also need to be considered. Smith (2005) identified two external factors which were home and school environments. The environments are important as it can reveal the degree of support the person receives in learning how to communicate.

Furthermore, Ganz et al. (2014) conducted a meta-analysis of the literature to investigate how the participants’ characteristics fit with the type of AAC method chosen. The researchers found that SGDs were the most effective with individuals who have ASD, and that PECS was the most effective with individuals who have ASD and an intellectual disability. The reason why the researchers found that PECS was the most effective for individuals who have intellectual disabilities is their basic or concrete understanding. For example, by exchanging pictures to receive items it provides individuals with a basic understanding of requesting and receiving items. Ganz et al. also found that SGDs and PECS were the most effective with preschoolers, but there was no difference between adolescents and adults. The reason for this is adolescents and adults have more experience in using picture-based communication and other modes of AAC. However, these results need to be taken with caution due to the limited number of studies in this area and the small number of participants.

Another study found the importance of selecting a setting, AAC method or system, and the target outcomes when designing an AAC intervention (Ganz, Rispoli, Mason, & Hong, 2014). Ganz, Rispoli, Mason, and Hong (2014) conducted a meta-analysis of the literature to investigate the factors to consider when designing an AAC intervention. They found that using AAC was the most effective in general education settings, and that SGDs and PECS were the most effective when compared to other AAC systems. General education settings were the most successful in using AAC because of the increased number of opportunities for students with ASD to communicate with other peers. Finally, when handling challenging behaviours, the researchers found that SGDs had a larger impact than PECS. However, the researchers did not provide reasons why for these findings, and to interpret these results with caution due to the limited number of studies in this field and the small number of participants. Overall, these studies demonstrated the importance of investigating an individual’s characteristics and setting when deciding upon the correct AAC method or device.

The literature review supported the thesis statement by providing an in-depth look at the effectiveness of various AAC devices, so professionals can make a more informed decision of
which methods would be the most effective for adults with developmental disabilities. The studies have demonstrated that a variety of AAC devices were found to be effective, especially SGD.s. With the effectiveness of AAC devices, it is essential to assess individual factors in order to increase an individual’s capacity to communicate.

Word Count: 3994
Chapter III – Method

A literature search was conducted in order to gather information on the effectiveness of AAC methods. The information was gathered through the EBSCO database, which was available at St. Lawrence College (PSYCHinfo). Besides articles, books were collected at St. Lawrence College and government websites were accessed to gather information. These three sources were chosen because they were the most reliable sources that were found when gathering research. The inclusion criteria for the articles included participants who were adults with developmental disabilities and had speech impairments. The participants in the studies also included caregivers or users who facilitated the implementation of AAC. Moreover, there were various settings in the articles in which AAC could be used such as people’s homes, schools, and agencies.

Initially, the search terms used in the databases consisted of augmentative and alternative communication and developmental disabilities, which resulted in five articles used for the thesis proposal. However, the literature search was broadened to increase the number of articles on the different styles of AAC such as manual signing.

Articles were chosen if they were full-text, and were related to the effectiveness of aided and non-aided AAC tools and methods. A similar method was used to choose books and government websites. In total 19 articles, three books, and two professional websites were used for the literature review. Of the articles, 18 were used to provide empirical evidence (Appendix A). The remaining articles, books, and websites were used to provide general information.

The chosen articles focused on the effectiveness of AAC methods with individuals who have developmental disabilities. The articles used a variety of settings such as classrooms, homes of the participants, clinical settings, in groups, and one-on-one. The articles were published in English, were peer-reviewed, and were published within the last 37 years. At first, a 10-year timeline was used for the articles, but the timeline was extended to 37 years to produce enough peer-reviewed articles for manual signing. The outcome measures that were included consisted of successful and unsuccessful outcomes. After the literature search was completed, comparisons were made to identify the similarities and differences between the methods and results found in the articles. Based on the literature review, the effectiveness of AAC tools and methods was determined from the common findings retrieved from the articles.

The Results section consisted of summarizing the main findings found in the literature review. The results were determined by the common trends found within the articles. The Results section was divided into three main sections: the effectiveness of non-aided and aided AAC approaches and the important factors to consider when selecting an AAC method.
Chapter IV – Results

This thesis examined the literature that studied the effectiveness of various AAC methods used by adults who have developmental disabilities. The aim of this thesis was to investigate the literature to determine if AAC methods were effective in allowing adults who have developmental disabilities to communicate if they were unable to do so verbally or through writing. The study of the literature supported the thesis statement that a variety of AAC methods enabled adults with developmental disabilities to communicate. The results from this study were used to provide recommendations to agencies on which methods would be best suited for certain developmental disabilities.

This section outlined the information that was gathered during the Literature Review section. The results were used to highlight crucial themes and findings. The Results section followed the layout of the Literature Review section: effectiveness of non-aided and aided approaches, comparing the effectiveness of two or more approaches, and factors to consider when selecting an AAC method.

Effectiveness of Non-Aided Approaches

The literature revealed that manual signing could be used effectively with other populations other than people who were deaf, which included people who had autism, intellectual disabilities, and apraxia of speech. Manual signing could be effective with people who were non-verbal by enabling them to communicate essential needs and wants. However, it was noted that more studies need to be conducted on the effectiveness of manual signing when compared to other AAC methods.

Effectiveness of Aided Approaches

There are many types of aided approaches such as VSDs and tablets. The studies showed that both of these approaches were effective in enabling people to communicate. VSDs were shown to be effective with people who have aphasia and autism by increasing narration or storytelling skills. The main methods used to communicate stories were speech and personally relevant photographs. The literature stressed the importance of conducting individual assessments to determine a person’s skill level and personal needs in order to find an effective AAC method or device that would maximize the individual’s ability to communicate with other people. A common limitation was the small number of participants. The literature suggested that future studies should be conducted to investigate whether or not VSDs would be effective with other populations such as adults with developmental disabilities.

Tablets such as iPads and iPods were found to be effective with children who have ASD, neurodevelopmental disorders, and cerebral palsy. The tablets helped increase children’s requesting skills and picture and word matching skills. In the literature, SGDs were used to help increase communication and academic skills. Besides using SGDs to help increase communication skills, the literature demonstrated the importance of training key people in the participant’s environment on how to use an SGD to help teach skills to individuals who need AAC. Throughout the literature a small number of participants was a recurring limitation.
Future studies could investigate if tablets would be effective with adults who have developmental disabilities since there are very few studies about this population in regards to AAC. The literature also portrayed the importance of conducting individual assessments to find an AAC device that would meet the needs of the individual using it.

**Effectiveness of Comparing Two or More Methods at a Time**

The research conducted in this part of the literature review demonstrated that using MS, PECS, and SGDs were effective with various populations. These populations included people with Rett syndrome, severe developmental delays, developmental disabilities, and ASD. The three types of AAC methods were found to be effective in improving people’s communication skills, social skills, requesting skills, and learning rate. The literature found that most people preferred using the SGDs the most, followed by PECS, and then MS. However, some people preferred using PECS or MS. In the literature SGDs had the highest social validity due to perceived intelligibility, effectiveness, and preference. A limitation found in the literature was the small number of participants and lack of generalization.

**Factors to Consider When Selecting an AAC Device/Method**

The Literature Review section investigated the importance of studying intrinsic and extrinsic factors in order to design an appropriate AAC method or tool to help people communicate. The literature revealed the significance of considering individual characteristics and the environment to choose a suitable AAC intervention for adults who need AAC methods to communicate. SGDs were found to be more effective with people who have ASD, while PECS was more effective with individuals who have ASD and intellectual disabilities. AAC methods were also more effective in general education settings and that SGDs had the most impact on individuals with challenging behaviours.

These key findings and themes will be discussed in further detail in the Discussion section. The implications of these results will also be discussed on how this field impacts people who have severe communication impairments and the agencies who work with this population.
Chapter V: Discussion

The Discussion section examines the findings and implications of the results from the literature review. The strengths and limitations of the thesis are discussed from a multilevel perspective: client, program, and societal levels. The Discussion section also presents the contribution this thesis had to the Behavioural Psychology field and recommendations for future studies.

Implications of Results

This thesis was an extensive literature review on the effectiveness of AAC when used with adults who have developmental disabilities. Throughout the years AAC methods have been used to provide a way for people with severe communication impairments to convey information. Previous research has shown that a variety of AAC methods were effective, which is why finding the best fit for a person would produce the greatest benefits when the person is striving to communicate. As a result, factors such as physical, visual, auditory, and cognitive processes need to be considered when finding the most beneficial AAC method to use.

SGDs such as electronic devices that produce pre-recorded speech of another person or computer-generated speech are the most beneficial for people who have decreased intellectual and motor abilities (Stasolla et al., 2014). The reason why these types of electronic devices would be beneficial for this population is providing people an alternate means to communicate. For example, people who have decreased motor and intellectual abilities can use electronic devices to select which information to convey if the individuals have a decreased capacity for speech. As a result, people who do not have strong motor and intellectual abilities can communicate more effectively. Furthermore, SGDs can also provide a voice for people who do not have the ability to speak, but are able to understand language, be able to see visually, and have some motor capabilities to press buttons.

The use of tablets such as iPads and iPods would be the most beneficial for people who have ASD or disabilities that caused severe communication impairments, but have motor capabilities to tap on a tablet screen and the ability to comprehend the language on the screen. Tablets can provide people with ASD or intellectual and developmental disabilities to convey information such as needs and wants. Also, programs on the tablets are easy to use and accessible to consumers.

Based on the literature, PECS was found to be more effective with people who have a combination of ASD and intellectual disabilities or just ASD alone. The possible reasons for this are PECS is best used with individuals who are able to comprehend words and pictures and have enough motor ability to either point to the picture or tear off a picture with Velcro. Depending on the severity of the ASD or intellectual disability people can still display motor and comprehension skills in order to use PECS to communicate. Without these essential skills, people who have communication impairments would not be able to use this type of AAC to convey information.
Manual signing would be more effective with people who have fine motor and motor imitation skills and are able to use memory recall to remember how to form the signs. Without these abilities, especially fine motor skills, people would not be able to form the signs using fingers. As a result, there may be some miscommunication or inability to communicate.

By knowing these types of characteristics that go with each AAC device, professionals can assess what device would work best for people who would use AAC. Being equipped with an appropriate AAC device would help maximize the person’s potential to communicate. As a result, individuals would be able to interact with other people and to participate actively in the community. For agencies, having the proper AAC devices for clients means there can be an increased level of clear communication between staff members and clients in regards to conveying messages.

Even though AAC methods are effective in providing people an alternative way to communicate there are barriers that families and agencies face when working with people who need to rely on AAC. One barrier is cost. SGDs and the programs on these tablets can be expensive to purchase especially for families and agencies who have a strict budget. For example iPads can range from $300 to $1000 to buy in addition to any programs that cost extra to purchase. One program called Proloquo2Go is an additional $400 to the purchase of an iPad. Overall, SGDs are expensive to purchase and would have a negative impact on a person’s finances. Time is a barrier particularly for agencies in regards to having the time and resources to train people on how to use the AAC devices while balancing other responsibilities and tasks. Some of the competing demands that agencies may need to give a higher priority are meeting the needs of the clients, running activities and programs, and solving issues that may arise when working with families or within the agency. Conducting assessments to find the most effective AAC method for a person and training people on how to use AAC takes a lot of time that agencies do not have. As a result, agencies have time and financial constraints that may prevent them from purchasing AAC methods.

This literature review examined various research studies that are summarized in Appendix A. This study can be used as the grounds for empirical research into the effectiveness of AAC methods as a tool to enable people to communicate. With the effectiveness of AAC methods on various populations and the types of barriers that agencies face in regards to AAC, it would be beneficial if the government provides increased funding to individuals who need AAC.

**Strengths and Limitations**

**Strengths**

One strength of the thesis was the methodology used to gather the information. This method provides a reference to all of the literature that was reviewed such as the methods and results of the articles, but are not necessarily included in the Literature Review section. Another strength of this thesis was providing families and agencies with a resource on AAC methods thereby helping to determine which types of clients would benefit the most from using certain AAC devices.
Limitations
One major limitation of the literature review was it was an overview of other researchers’ studies. As a result, none of the clients the author worked with were included in the study of comparing the effectiveness of various AAC methods.

Another limitation was the limited amount of research on the effectiveness of AAC methods with adults who have developmental disabilities. Even though the literature demonstrated the effectiveness of AAC methods with other populations, there is no certainty that these methods would work with adults who have developmental disabilities.

Application to the Behavioural Psychology Field

This thesis contributed to the field of Behavioural Psychology by helping professionals become more effective in assessing people who need AAC. This thesis would provide professionals a resource on the types of factors that would be necessary to determine the appropriate AAC device for an individual to use. By knowing which types of AAC methods work best for certain individuals, professionals can help increase communication skills in adults who have developmental disabilities.

Suggestions and Recommendations

First, it is recommended that more studies need to produce clinical data on the use of AAC methods to increase communication skills in adults with developmental disabilities. Due to the small number of participants in all of the studies, larger samples need to be used to produce statistically significant results in the clinical data.

Secondly, it is recommended that key people in the individual’s life should be trained on the use of AAC devices as well. By training these key people, they will be able to communicate with the individual using the AAC device and be able to provide assistance if the AAC device malfunctions.

Finally, this literature review brings awareness to professionals on the importance of using AAC methods for clients who need it to communicate and to help improve the quality of life for individuals who rely on AAC. Knowing the benefits of AAC may result in these methods becoming more widely used and to help increase government funding for agencies and families who cannot afford it.

Recommendations for Future Research

It is recommended that future research investigate the training of individuals, both the client and key people in the client’s life, on how to use AAC methods. By doing so, individuals who need AAC can be understood by other people when they communicate. Studies should also investigate the effectiveness of using these AAC methods with adults who have developmental disabilities and on training caregivers and staff members. Finally, it is recommended that future studies examine funding issues and barriers that agencies and families may face when using AAC methods for adults with developmental disabilities.
References


## Appendices

### Appendix A: Method – Summarized Articles

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<thead>
<tr>
<th>Author/Title</th>
<th>Method</th>
<th>Results</th>
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<tr>
<td>Achmadi, D., Sigafoos, J., Van Der Meer, L., Sutherland, D., Lancioni, G., O’Reilly, M., Hodis, F., Green, V., McLay, L., &amp; Marschik, P. (2014). Acquisition, preference, and follow-up data on the use of three AAC devices by four boys with developmental disability/delay. <em>J Dev Physical Disabilities, 26</em>, 565-583. doi: 10.1007/s1088-014-9379-z.</td>
<td>The researchers compared how quickly four boys with a developmental disability learn how to use MS, PE, and SGD to request to play with toys. The children were either diagnosed a developmental disability with limited communication skills. The children also had beneficial hearing, vision, and/or motor skills to use the AAC devices. The SGD was a program called <em>Proloquo2Go</em> on an iPod Touch. The PE was a symbol from Boardmaker put on a laminated piece of white paper and the MS was a drawing illustrating a symbol based on the Makaton Sign Language. The researchers used an alternating treatment design through a natural play session. The researchers taught the participants how to use the three AAC systems until they met the criterion of 8 out of 10 correct responses. They would interrupt the child’s toy play after 1 minute into the session and said “Let me know if you want more.” There were opportunities to choose an AAC device in order to determine preference. The follow-up sessions occurred at 12, 15, and 18 months post-intervention.</td>
<td>Three out of four boys learned to use each option, but the fourth only learned to use PE. Trials to criterion across children ranged from 22-28 for SGD, 12-60 for PE, and 21-64 for MS. Maintenance results were best for PE and SGD and the preference results showed that the participants most often chose the SGD. The authors found that using instructional procedures was effective in teaching the children how to request for continuation of toy play using the three AAC devices.</td>
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| Achmadi, D., Van Der Meer, L., Sigafoos, J., Lancioni, G., O’Reilly, M., Lang, R., Schlosser, R., Hodis, F., Green, V., Sutherland, D., McLay, L., & Marschik, P. (2015). Undergraduates’ perceptions of three AAC modes. They showed 104 undergraduates a 90 second video clip of a person using each of the three AAC modes. The person in the video did not | The authors assessed undergraduates’ perceptions of three AAC modes. They showed 104 undergraduates a 90 second video clip of a person using each of the three AAC modes. The person in the video did not | The mean ratings for perceived intelligibility and effectiveness/acceptability were significantly higher for the SGD. The SGD and MS options were rated |
### AAC Modes and Communication

<table>
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<th>Source</th>
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<td><strong>AAC</strong></td>
<td><em>Three AAC modes.</em> Developmental Neurohabilitation, 18(1), 22-25. doi:10.3109/17518423.2014.962767.</td>
</tr>
<tr>
<td>Cannella-Malone, H., Fant, J., &amp; Tullis, C. (2010). Using the picture exchange system to increase the social communication of two individuals with severe developmental disabilities. Journal of Developmental and Physical Disabilities, 22, 149-163. doi:10.1007/s10882-009-9174-4.</td>
<td>The researchers investigated the effectiveness of PECS on increasing social communication in two females with developmental disabilities. The researchers trained the participants on how to use PECS. They used multiple baseline across behaviours (greetings, requests, and responses to their peers using PECS). The communication book was used to hold the PECS. The pictures for PECS were taken from Boardmaker. The peers were also taught how to respond to the subjects.</td>
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<tr>
<td>Desai, T., Chow, K., Mumford, L., Hotze, F., &amp; Chau, T. (2014). Implementing an iPad-based alternative communication device for student with cerebral palsy and autism in the classroom via an access technology delivery protocol. Computers and Education, 79, 148-158. doi: 10.1016/j-compedu.</td>
<td>The researchers evaluated the impact of introducing a high-tech AAC device on increasing communication skills in a student with cerebral palsy and autism. They used a program called “GoTalk Now” on an iPad, which had vocabulary layouts that fit the needs of the individual. The student was trained on how to make requests on the iPad. The parents and the teachers were trained on how to communicate with the student, how to create opportunities both at home and at school to use the</td>
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**AAC** refers to augmentative and alternative communication methods used to augment and/or replace spoken language. The three AAC modes mentioned are likely to refer to different types of AAC systems: MS (Multi-Symbol), PE (Picture Exchange Communication System), and SGD (Scan and Go Device). Each system has its own advantages and disadvantages in terms of intelligibility, ease of acquisition, effectiveness, and preference. The researchers aimed to assess which of these systems was most effective in their study context. The video mentioned suggests a focus on practical communication rather than full speech, and the researchers were interested in how participants preferred these systems in a real-life setting.
iPad and how to fix any technological issues that may arise. The integration of the technology focused on promoting key elements associated with long-term AAC usage, targeted training of the student, teacher, EA, and parents over the school year.


The aim of the research was to describe the communication barriers of five people with chronic aphasia when they retold personal narratives to an unfamiliar communication partner using four variants of a VSD interface. The communication partner was a female undergraduate. The researchers created VSD displays on a program called “DynaVox Vmax” based on the stories the participants presented to them. The researchers trained the participants and the communication partner on how to use the device. They videotaped the sessions where the participants re-told stories to the communication partner. Afterwards, the authors transcribed the tape and determined what expressive modalities were used during the session: spoken, written, drawn, photograph, text box, and a speak button. Then, the researchers investigated if there were any trouble sources that occurred during the session (communication breakdowns and repairs)

The researchers found that several people with aphasia experienced no trouble sources during the retells using VSDS with personally relevant photographs and textboxes. The participants perceived the personally relevant photographs and the text as helpful during the retells. Four people primarily relied on speech to tell the narrative while one person relied on the speak button to communicate.

Ganz, J., Hong, E., Gilliland, W., Morin, K., & Svenkerud, N. (2015). Comparison between visual scene displays and The authors investigated the effectiveness of VSDs versus traditional grid-based systems The researchers found that one participant preferred using the VSD
exchange-based communication in AAC for children with ASD. Research in ASDs, 11, 27-49.

They tested the impact these methods have on the number of spontaneous comments and correct answers to questions made by two male, preschool children with autism. The participants were exposed to two conditions during the reading of a book: VSD (GoTalk Now Plus application) and an exchange-based communication system. After reading a page in a book, the researcher waits 10 seconds to see if one of the participants makes a comment verbally or through the AAC method. After the end of the 10 second interval, the researchers asks a question based on the page in the book where the participant has to answer in 5 seconds. If the participant chose incorrectly (touched an incorrect icon or handed over a wrong picture) the researcher ignored the mistake and moved on to the next step.

while the other preferred neither.


The researchers conducted a meta-analysis of how individual characteristics affected the effectiveness of MS, PE, and SGDs. They initiated a literature search on the use of AAC with individuals who have ASD. They used online databases such as social sciences and education. The key terms used during the search included Asperger’s, ASD, pervasive developmental disorder, AAC, and PECS. All of the articles were evaluated to determine if they meet the criteria: at least one participant was diagnosed with a pervasive developmental disorder, were struggling with academic skills, while the other preferred neither.

The SGDs were the most effective with individuals with ASD. PECS appeared to be the most effective with individuals who have autism and intellectual disabilities. Also, SGDs and PECS were the most effective with preschoolers, but it did not make a difference with adolescents and adults.
challenging behaviour, or social skills, and used AAC and single case designs. All of the articles were analyzed and summarized.

| Ganz, J., Rispoli, M., Mason, R., & Hong, E. (2014). Moderation of effects of augmentative and alternative communication based on setting and types of aided augmentative and alternative communication on outcome variables: An aggregate study of single-case research with individuals with autism spectrum disorder. *Developmental Neurorehabilitation, 17*(3), 184-192. doi: 10.3109/17518423.2012.748097. | The researchers conducted a meta-analysis to investigate the effectiveness of intervention setting and the type of AAC on students who have ASD. They looked at databases such as ERIC, PsychINFO, Education, and Social Sciences. They also used key terms such as ASD, pervasive developmental disorder, Asperger syndrome, AAC, and PECS. Each article was assessed to see if it fit the criteria: at least one participant was diagnosed with ASD, measured academic skills, challenging behaviours, and social skills, investigated the use of AAC, used single-case research designs, and used line graphs. The researchers found that aided AAC worked best in a general education settings. The SGDs and PECS were the most effective on communication skills and that SGDs were the most effective on people with challenging behaviours. |
| Griffith, J., Dietz, A., & Weissling, K. (2014). Supporting narrative retells for people with aphasia using augmentative and alternative communication: Photographs or linedrawings? Text or no text? *American Journal of Speech-Language Pathology, 23*, 213-224. | The authors examined how the interface design of an AAC device with combinations of personally relevant photographs, line drawings, and text for each part. There were four participants in the study with Broca’s aphasia. The authors used a program called DynaVox Vmax to create VSDs. They provided orientation to the participants in order to familiarize themselves with the VSDs. Before the narrative session the participants acquainted themselves with the listener who was a female undergraduate student. The narrative retell sessions were recorded and were transcribed afterwards in order to determine The participants primarily used spoken EMUS to retell their narratives. They also relied on PR photos more frequently than line drawings, but both were helpful. The LDs served as an effective visual support when PR photos were not available. |
the type of expressive modalities used. The expressive modalities included spoken, picture, text box, speak button, written, and drawn. Overall, the narrative retells were analyzed to describe the expressive modality units (EMUs) used, trouble sources experienced, and whether trouble sources were repaired. They explored the participants’ perceived helpfulness of the interface features between each retell session.

| Grove, C., O’Sullivan, F.D., & Rodda, M. (1979). Communication and language in severely deaf adolescents. *British Journal of Psychology, 70*, 531-540. | The researchers conducted an experimental study to investigate whether total methods were more effective than oral methods. The participants consisted of adolescents who were severely deaf. The participants had to choose the correct picture out of eight that matched the researchers’ message. The researchers provided the message by the participants’ preferred method of communication (oral, manual signing). | There was a high level of scoring for both methods so there was a strong ceiling effect. The scored were used for factorial analysis of variance. The researchers found that the total system was found to be more effective when comparing all aspects of the structure that was investigated (abstraction and tense and voice in regards to syntax). |

| McLay, L., Meer, L., Schafer, M., Couper, L., McKenzie, E., O’Reilly, M., Lancioni, G., Marschik, P., Green, V., Sigafoos, J., & Sutherland, D. Comparing acquisition, generalization, maintenance, and preference across three AAC options in four children with autism spectrum disorder. *J Dev Physical Disabilities, 27*, 323-339. doi:10.1007/s10882-014-9417-x | The researchers taught use of MS, PE card, and a SGD to four children with ASD. The inclusion criteria consisted of a diagnosis of ASD, must be 12 years or younger, have an expressive language of 2 years or less, and have sufficient sensory and physical ability to use the three AAC options. The SGD was a program called Proloquo2Go. The PE was a communication board where the symbol *More* was attached on and the MS was New Zealand Sign Language for the sign. | The three children reached the acquired criterion with each AAC option in 15-65 trials. One child learned to use the SGD and PE in 20 and 40 trials, but failed to learn MS. Two of the children showed generalization across settings and people with PE and SGD but one child showed gen. with all three AAC methods. |
More. The intervention was staggered across four children in a delayed multiple-probe design with acquisition and maintenance compared in an alternating treatments design. The researchers placed one of the AAC options within reach of the child. After the child plays with a box of toys for 60 seconds, one of the researchers takes the box of toys away and tells the child, “Let me know if you want more.” The researcher gave the child 10 seconds to respond using the AAC option. If the child provides a correct response, the researcher provides the child immediate access to the box of toys. If the child made an incorrect response the researcher used least-to-most prompting with the child. The generalization to new settings and people and preference for using each option were assessed. The children chose SGD most often during preference assessment.


The authors used an iPad-based intervention to teach picture and word matching skills. The participant was a boy with ASD and a severe communication impairment. The SGD was a program called *Proloquo2Go* on an iPad. The authors selected 12 picture cards that were separated into three categories: clothes, animals, and food. They used a multiple baseline across four matching tasks (i.e. picture-picture, word-picture). They used a graduated guidance prompting procedure and differential reinforcement to teach these skills. The researchers asked the boy what he saw on the card and had to

The researchers found there was an increase in correct matching across all four matching tasks. For the picture to picture the participant’s performance at the end of the study was 92-100% correct responding. For the word to picture it was 75-100%, picture to word was 75%, and word to word was 67-100%.
press the correct button on the iPad.

| Meer, L., Kagohara, D., Achmadi, D., O’Reilly, M., Lancioni, G., Sutherland, D., & Sigafoos, J. (2012). Speech-generating devices versus manual signing for children with developmental disabilities. *Research in Developmental Disabilities, 33*, 1658-1669. doi:10.1016/j.ridd.2012.04.004. | The researchers compared how quickly the four children learned MS, and a SG. They taught how to request preferred items using an alternating treatments design. The program the participants used was Proloquo2Go on a iPod Touch and they used manual signs from the Makaton Sign Language. The researchers placed one of the AAC options on the table beside a tray of toys/snacks. One of the researchers stated, “Let me know if you want something.” The researcher would give a 10-second delay before using graduated guidance to help the child to make a correct response. If the correct response was made, the researchers let the child choose a preferred snack or toy for 30 seconds. | All four of the children learned the SGD while only three learned the MS. The participants preferred the SGD over the MS and three of the boys reached the criterion for both AAC methods. |

| Roche, L., Sigafoos, J., Lancioni, G., O’Reilly, M., Schlosser, R., Stevens, M., Meer, L., Achmadi, D., Kagohara, D., James, R., Carnett. A., Hodis, F., Green, V., Sutherland, D., Lang, R., Rispoli, M., Machalicek, W., & Marschik. (2014). An evaluation of speech production in two boys with neurodevelopmental disorders who received communication intervention with a speech generating device. *International Journal of Developmental Neuroscience, 38*, 10-16. doi:10.1016/j.ijdevneu.2014.07.003 | The researchers investigated the effectiveness of using a SGD to increase requesting skills (preferred objects). The participants were two boys with neurodevelopmental disorders. The participants pressed a button on the iPad, which produced synthesized speech of the item they wanted. The program the participants used was Proloquo2Go on an iPad. After three minutes of a preferred activity, one of the researchers would take away the preferred item (book or toy). If the participant made a correct response using the SGD of requesting to have access to the preferred item, the researcher would provide the item right | The participants learned how to use the SGD to request objects and they responded more frequently with natural speech when the SGD was removed. Teaching the participants using systematic instructional procedures seemed to be effective in instructing them on how to make a request using an iPad. |
away. If the participant did not provide a correct response then the researcher would provide least-to-most prompting. The researchers took away the SGD to produce more opportunities for the participants to speak.

| Stasolla, F., Pace C., Damiani, R., Leone, A., Albano, V., & Perilli, V. (2014). Comparing PECS and VOCA to promote communication opportunities and to reduce stereotyped behaviours by three girls with Rett syndrome. *Research in Autism Spectrum Disorders, 8*, 1269-1278. doi: 10.1016/j.rasd.2014.06.009 | The authors investigated the effectiveness of PECS and VOCA on increasing communication skills (requesting) in three girls with Rett Syndrome. They did an alternating treatments design with a final preference check at the end. The PECS involved exchanging a picture for an item they wanted while VOCA involved using a keyboard which produced sound. The participants had to make a request using either PECS or VOCA within 60 seconds. If the participants did not make a request then prompting was used. There was an increase in communication skills where the girls requested for items independently. Two of the girls preferred the SGD, while the other preferred both of them equally. |
| Schuebel, C., & Lalli, J. (1992). A program for increasing manual signing by a non-vocal adult within the daily environment. *Behavioural Residential Treatment, 7*(4), 277-282. | The researchers implemented a program to increase manual signing skills in an adult who was non-verbal. The program consisted of modeling, verbal and physical prompts, positive reinforcement, and naturally occurring reinforcers. The programs were implemented by eight personnel who helped care for the adult in a community living arrangement. The adult was taught how to sign what items he needed for his bathroom routine. If the participant did not use the manual sign correctly, one of the personnel used most-to-least prompting. The participants learned how to use manual signing independently during structured interactions. Also, using a modified-incidental teaching procedure was effective in increasing the use of manual signs. |

The researchers investigated the effectiveness of using an SGD to teach a three-step procedure to three children with ASD. The procedure consisted of making a general request to play with toys, making a specific request for a certain toy, and saying “thank-you”. The authors used a multiple-baseline across participants. They taught the participants how to use the SGD through least-to-most prompting, time delay, error correction, and reinforcement. The SGD was a program on a iPad called *Proloquo2Go* and generalization and follow-up were conducted for two out of three participants.

All three subjects showed improvement in using the three-step procedure. Their progress was maintained by using the procedure with an unfamiliar person and during follow-up.