Augmentative and Alternative Communication for Autism Spectrum Disorders Children's Language and Communication

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A B S T R A C T

Augmentative and Alternative Communication (AAC) is an expressive and receptive method of communication that helps in developing language and communication skills for people with speech and/or language impairment. Children with autism spectrum disorders (ASD) who lack communication can improve functional communication by personalizing AAC intervention. This paper is based on literature to promote AAC interventions to enhance English language acquisition in autism spectrum disorder (ASD) children. This paper also explores how multimodal and naturalistic AAC benefit ASD children's communicative and language skills. Recommended herewith is to personalize AAC intervention based on children's mental and physical condition and their needs, skills, and social environment's priority.

1. Introduction

Children who have typical growth and development acquire and learn language rules in a predictable order. They acquire language unconsciously when they hear it in real communication, understand the message, and receive comprehensible input. Meanwhile, they learn a language consciously and monitor their progress. There is a cognitive process in the children's brains to acquire and learn a language. Each child has a Language Acquisition Device (LAD) that successfully enables acquisition and learning. When there is a mental block, children will be hard to acquire knowledge of the language (Krashen, 1982, 1989; Mohamad Nor & Rashid, 2018).

Children who do not achieve the expected milestone in growth and development may have communication disorders that may prevent the message or input to their LAD. They have problems producing speech sounds, language structure and function, and communicating using verbal or nonverbal behavior. Autism spectrum disorder is commonly associated with language disorders. Besides having impairment in social interaction and repetitive patterns of behavior, the core symptom of ASD is communication deficits, the impairment in social communication, such as having language and hearing delays, poor comprehension of vocabulary, grammar, or speech, and having echoed speech. (American Psychiatric Association, 2013; Gregg, 2017; Syriopoulou-Delli & Eleni, 2021).

There is an increasing number of children with autism in the world (Zohoorian et al., 2021). Around 97 million people worldwide suffer from severe disabilities that prevent them from communicating using speech (Chavers et al., 2022). According to estimates, 1.3 percent of the world's population would at some point in their lives be unable to speak naturally because of inherited or acquired conditions such as autism, Rett syndrome, cerebral palsy, ALS, or paralysis brought on by a stroke (van Grunsven & Roeser, 2022) and one in every 100 children in the world is an autistic child (World Health Organization, 2022). While in Indonesia, it is estimated that 3.1 million people were

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included as people with autism spectrum disorder (ASD) in 2018, with annual addition of 500 new people (Simbolon et al., 2020). Like typically developing people, they have the right to be treated equally and given an equal chance in education (UNESCO, 2016), including English language education (Zohoorian et al., 2021). Furthermore, to support children with multiple disabilities (Holyfield et al., 2019), such as those with autism spectrum disorder (Bondy, 2019), Angelman syndrome (Roche et al., 2020), and Down syndrome (Thaís et al., 2018), in acquiring and learning English, augmentative and alternative communication (AAC) intervention is suggested.

AAC is a solution to solve long-standing functional communication and education problems by adapting to AAC devices based on their mental and physical condition (Bondy, 2019; Gonçalves et al., 2022). Therefore, it is essential to investigate an appropriate technology design fit for AAC to support effective social communication, plan their Individual Education Plan (IEP), and increase classroom interaction quality (Gregg, 2017; Light, McNaughton, et al., 2019; Light, Wilkinson, et al., 2019; Padmadewi & Artini, 2017). In addition, AAC tools and strategies help children with language impairments complement and replace speech and writing (augmentative) and communicate besides talking (alternative) (Brignell et al., 2016).

There are two types of AAC systems, namely, unaided communication systems and aided communication systems. For example, gestures, sign language, and facial expressions that can be performed without supplementary devices belong to unaided AAC. Instead, the body is used as means of communication. Writing, drawing, and picture cards belong to low-tech aided AAC. Meanwhile, iPad or tablets, and computers with a "voice" or speech-generating Device (SGD) are categorized as high-tech AAC since auxiliary types of equipment are required for communication (Sennott & Mason, 2016; Syriopoulou-Delli & Eleni, 2021).

In evidence-based practices, the focus on the AAC field is increasing (van Grunsven & Roeser, 2022). AAC technologies continue to develop (Holyfield et al., 2019). Moreover, the AAC method will be used in meticulous research in the future (Syriopoulou-Delli & Eleni, 2021). This paper explains AAC intervention to facilitate English language acquisition, especially for children with an autism spectrum disorder. In addition, this paper also explores multimodal AAC integrated with a naturalistic approach to help ASD children initiate communication and improve the quality and quantity of their communication.

2. Methods

This study aims to explore the intervention using augmentative and alternative communication, the kind of multimodal AAC, and the personalized naturalistic AAC to help children with autism spectrum disorders acquire the English language and have better communication with parents, peers, and people in the community. To reach those aims, this study employed a qualitative-interpretative design. A literature review had been conducted and the data in the forms of books, journal articles, and so forth were arranged and interpreted. There were no research participants or respondents in this study (George, 2008).

3. Results and Discussion

There were three points underlined in this study, as follows: 1) promoting augmentative and alternative communication intervention to enhance children with autism spectrum disorders' English language acquisition and communication, 2) exploring multimodal AAC, and 3) emphasizing the importance of personalized naturalistic AAC.

3.1. Augmentative and Alternative Communication (AAC) technologies

Lack of spoken language development, idiosyncratic vocabulary, repetitive language use, inability to start or maintain a conversation with others, absence of age-appropriate social imitative play, or absence of spontaneous pretend play are all symptoms of ASD people (American Psychiatric Association, 2013). Many people with ASD are hesitant when it comes to speaking, or they become

anxious when they need to conduct a simple conversation. As a result of poor communication, leaving an ASD person alone may be challenging because it will have a detrimental impact on society. Since people with ASD live in society, they must communicate and express their emotions (Almurashi et al., 2022).

Fulfilling their fundamental communication requirements and desires, communicating information, and engaging in social interaction skills, many rely on augmentative and alternative communication (AAC) technologies or AAC tech. For instance, in communication, people who use AAC may point to an image of an orange, touch an orange-related icon on a speech-generating device (SGD), or produce a manual indication for orange in place of speaking the word (Chavers et al., 2022). AAC Tech makes these realms more accessible to a broader range of people, who will probably alter by adopting more inclusive standards and being able to contribute to the empathetic turn (van Grunsven & Roeser, 2022).

Functional communication can be achieved or improved with the aid of modern AAC technology (Bondy, 2019). The phrase AAC Tech refers to a broad range of low- and high-tech artifacts, including simple writing instruments and image boards (low-tech), speech generators, mobile devices like smartphones and tablets with speech-supporting applications, and eye tracking and gaze interaction technology (high-tech). AAC Tech must consider the various ways individuals and communities can have distinctive communication styles. It must be acknowledged that these people and communities risk losing some of their identity (or never regaining it) if the technology they rely on for self-expression prevents them from expressing themselves outside of conventional communication norms and practices, which are frequently foreign to them (van Grunsven & Roeser, 2022). Individuals with developmental disabilities can improve their verbal, social, and literacy skills by using systematic intervention programs that present either dynamic grids or visual scenes. (Chavers et al., 2022).

3.2. Multimodal AAC Enhances Language and Communication Development

Children with complex communication needs can benefit from multimodal AAC to improve communication and increase engagement with partners and environments. Multimodal AAC includes natural talk, body language, and signs, low-tech AAC such as photographs, images, simple text, and letter cards, and high-tech mobile technology using a keyboard and an AAC application. Signs are typically integrated into all children's activities and are available throughout the day (e.g., reading a story, playing, eating). Without putting too much effort, children may mimic the hand motion and shape of the signs. However, they are unable to interact successfully with classmates or adults who do not interpret signs utilizing this modality (Light et al., 2021).

Meanwhile, low-tech aided AAC is portable, easy to introduce, and easily understood by a diverse variety of listeners (Ganz et al., 2014). Low-tech aided AAC has some drawbacks, including the fact that it may be challenging to interpret the symbols, that certain ASD students may lack the cognitive abilities required to pick messages, that the lexicon may be restricted, that it may not be transportable, and that constructing content and vocabulary may take time. Picture exchange communication systems (PECS) are examples of low-tech aided AAC, whereas speech-generating devices (SGDs) and mobile technologies with eye tracking, gaze interaction technology, and smartphone and tablet apps that support speech are examples of high-tech aided AAC (King et al., 2014; van Grunsven & Roeser, 2022).

Learning vocabulary is a crucial component of learning a language. In young children with autism who have language impairments, several interventions have proved effective in boosting vocabulary, semantic, morphological, and syntactic components (Zohoorian et al., 2021). There are several ways to obtain target vocabulary words and integrate them using the strategies (Light et al., 2021). It is important to create possibilities for meaningful dialogue. This meaningful dialogue aims at the acquisition of a diverse set of basic vocabulary ideas representing a wide range of semantic functions (e.g., agents, actions, objects, descriptors, locatives, question words, social words) as well as representation of early developing two configurations (e.g., the relation of semantic, like agent-actions, action-objects, and descriptors-object). Parents and teachers need to wait to give the children space to speak before they fulfill all of their requests for information or comments on experiences. Later, it is expected that children can extend to serve more complex language according to their needs and abilities.

There is a requirement for children with ASD to improve generalization abilities such as repeating what they say, introducing a descriptor, misdescribing any object identified by them, and modeling a somewhat more complex sentence (Ganz et al., 2019). ASD children may proceed introducing particular function words, as well as morphological and syntactic components gradually (e.g., usage of a or the articles, auxiliaries, third-person singular -s, conjunctions). They need help to prepare themselves using natural speech, gestures, and signs to improve their interaction and participation. They can be suggested to use low-tech AAC such as pictures, sketches, written sentences, and letter cards to facilitate communication and participate in any activities related to education and literacy. Moreover, they can also be assisted to use high-tech AAC in communication. The high-tech AAC includes speech plus signs, written and typed text, and TouchChat with WordPower. This kind of AAC enables children to focus on two things: (1) utilizing a large vocabulary of semantic concepts (such as a person, object, or activity) to communicate a variety of information and carry out a range of communicative functions; and (2) assisting children in communicating phrases and sentences related to her interest field. For instance, the children utilized the application to impromptu express, "I have a cat," during a class session centered on animals.

A study on a 3-year-old girl who suffers from complex communication needs and access to multimodal AAC shows that throughout the six-month intervention, her expressive language growth pursues the steps of other children with typical language development: In the beginning, she could speak simple content words, like *car, toy, mama*), then she started to produce semantic concepts like the combination of an object and its descriptor (like mama happy) or the combination of action and an object (like play toys), and finally she began to produce more complex structured sentences (like Mama plays toys). She did not start using some of the more regularly recurring structure words until much later in the development of her language. In addition, this girl made significant progress in morphosyntax as she moved from reading phrases to reading stories (Light et al., 2021).

Another study on two boys aged 12 and 9 with autism spectrum disorders, who learned English as their foreign language, shows that AAC intervention uses the association of words, pictures, and objects, which is known as a picture exchange communication system (PECS), was adequate in improving their English vocabulary learning. When autistic children are treated by using PECS, it treats communication as behavior and produces an effective exchange between a speaker and a listener. Supporting previous studies stating that PECS strengthens first language verbal communication and enhances practical communication skills, this study also recommends using PECS because it has a promising effect on the foreign language learning of ASD students. Furthermore, PECS can be applied in various situations where English is taught as a foreign language (Zohoorian et al., 2021).

Physical cards are used in the traditional PECS approach and serve as the foundation for learning verbal and social skills. Parents often introduce traditional PECS to their children when they are five years old. High-tech PECS based on modern technology, on the other hand, enables this technique to be introduced earlier. Modern technology creates a setting that stimulates the traditional PECS approach. According to a study by (Almurashi et al., 2022), ASD children can access modern PECS applications on mobile devices, smartphones, and tablets because they are familiar with them from an early age.

It has been discovered that the PECS application is used with other technologies and approaches, such as augmented reality (AR), virtual reality or human-computer interaction, mobile instant messaging, goal-directed design, the Treatment and Education of Autistic and Related Communication Handicapped Children methodology (TEACCH®), and Autisdata software (Almurashi et al., 2022). Augmented reality, for example, can help provide ASD children with social communication skills (Almurashi et al., 2022) and vocabulary learning (Khowaja et al., 2020).

The following are the specific communication skills that AAC aims to improve: (a) requesting skills (for example, asking for desired things, meals, activities, and actions); (b) speaking, dialogue, and interpersonal communication abilities; (c) preference evaluation for different kinds of AAC; (d) usage of multi-symbol communication; and (e) literacy and spelling abilities (Syriopoulou-Delli & Eleni, 2021). Most research examining the impact of AAC (PECS, SGDs, manual signing) on requesting skills yielded positive results. Some research concentrated on completing single requests, whereas others focused on completing several requests. (Almurashi et al., 2022; King et al., 2014).

Because personal computers, tablets, and cellphones have recently been extensively utilized and

familiar to young children, newer studies are employing high-tech AAC equipment (tablet-based SGDs). The majority of SGDs used (nearly 64 percent) were non-dedicated. Non-dedicated means the SDG in the form of software apps that could be installed on a mobile device, for example, iPad with Pick a word, iPad Touch with Proloquo2Go, iPad with GoTalk Now, iPad/ Dynavox, iPad with AutisMate, Tablet device with T2L, and Samsung Galaxy Tablet with AAC app based on PECS. Meanwhile, dedicated SGD not installed on smartphone devices include Vantage, Tech Speak, Springboard, and proxtalker (Syriopoulou-Delli & Eleni, 2021).

3.3. Personalized Naturalistic AAC

There are numerous efficient AAC approaches available. Not only are low-and high-tech aided AACs helpful, but unaided AAC is also useful to support autistic children's communication. One of the recommended methods is the natural communication method or the naturalistic method. Natural communication methods are those that do not require any additional support. These include nonverbal communication techniques, including miming, pointing, gesturing, and using body and face in nonverbal ways (Bedwani et al., 2015).

The naturalistic methods that include learning in daily activities with anyone and about anything that interest the children are one teaching alternative. These AAC strategies are suitable for ASD children. Moreover, they are particularly important for training children with ASD to utilize AAC in a range of situations. Combining multimodal AAC in a natural situation may require not such a thorough observation of the ASD children to ascertain what they communicate in real-life situations, such as in the house or school. In addition, it may require parents to fulfill checklists about their children's interests in things and activities. It is necessary to give ASD children access to conversation starters and reinforcing subjects so they can use them as anchors to acquire new conversational techniques (Ganz et al., 2019).

Careful planning is crucial to preparing the instruction of the naturalistic method. The instruction should be carried out in natural settings, with the people the children usually communicate with, with the available topic they like and need, and with natural response and praise as reinforcement. AAC instruction can be delivered to how children with typical development acquire a language—by listening to people around them speak and then speaking when they are ready—by modeling both the use of AAC and speech (Ganz et al., 2019).

The term "personalized AAC intervention" describes a strategy in which the intervention is adapted to the requirements and abilities of the ASD and other complex communication needs of children, their parents, and other people's surroundings' needs and priorities, the body of research, and their reaction to the intervention. Children with complex communication requirements interact socially at home, at school, and in the broader environment rather than existing in isolation. Therefore, any interventions should trigger ASD children for subsequent participation in a variety of activities. This concept differs from a "one size fits all" strategy, proposing that everyone receives similar treatment without considering their unique needs, abilities, or environmental variables. Ensuring people get the proper intervention at the right moment is vital (Light et al., 2021).

An ASD boy, for instance, likes to discuss dinosaurs with his parents or teacher as his communicative partners. Using this engaging subject, the communicative partners would persuade and provide opportunities for him to ask questions about dinosaurs, express his opinions about the number and color of dinosaurs in pictures, and draw dinosaurs. These opportunities for communication are expected to gain a response from the child and give the communicative partners a chance to demonstrate how to use the AAC device and introduce a new language. The parents and teachers should ensure the target person enjoys the communication lesson and makes a decent attempt to respond.

Modeling can be used in realistic settings (Ganz et al., 2019). Parents and teachers can include symbols for important words needed for the forthcoming activity in the AAC device or communication book, use speech and AAC to simultaneously model language use, and speak while choosing symbols from the children's AAC device or communication book. For instance, the instructor might say, "You are coloring with a blue crayon," while pressing the COLOR, BLUE, and CRAYON symbols, to a child using crayons during playtime. It is important to practice using the main words for a certain activity, choose a symbol on the user's AAC device and describe it verbally, and describe the terms chosen in

more detail. For instance, if a child lays a dinosaur toy in the box, the parents or teachers could point to or touch the symbol on the child's AAC device while naming the symbols for DINOSAUR and BOX, then build a sentence, "The dinosaur is hiding in the box."

4. Conclusions

AAC (augmentative and alternative communication), unaided and low- and high-aided, has been used to increase the frequency and quality of language and conversation with young children suffering from complex communication needs (CCN), including those with autism spectrum disorders (ASD). AAC is helpful for children with ASD because of its visual aspect, making it easy to employ. AAC Tech is a multidisciplinary area that is still relatively new and focuses on creating solutions for persons who cannot use their natural speaking voice. The investigation into the personalization of AAC intervention in a natural setting is still in its early phases in the field of AAC. Future studies are necessary to comprehend the optimal way to apply intervention in an individual and evidence-based approach.

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