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Research Paper

Combining ABA and PECS Strategies to Enhance Learning of English Alphabet, Words, and Pronunciation in an Autistic Child

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Abstract

Despite communication challenges, research suggests that children with Autism Spectrum Disorder (ASD) can benefit from foreign language education. This aligns with their strengths in visual learning and the documented effect of Applied Behavior Analysis (ABA) in teaching language to children with ASD. Building on these strengths, this qualitative case study investigated the effectiveness of combining Applied Behavior Analysis (ABA) and Picture Exchange Communication System (PECS) strategies for teaching English language skills to an 8-year-old boy with high-functioning Autism Spectrum Disorder (ASD) at Sara Autism Center. The study employed detailed observations to explore the participant's experience learning English as a foreign language. The findings revealed a significant increase in vocabulary (30 words within three months) and highlighted the effect of ABA and PECS in facilitating language acquisition and generalization. The use of the Let Me Talk app on an iPad to support communication and parental involvement were identified as crucial factors for success. This case study emphasizes the importance of multimodal learning approaches. It also highlights the need to tailor interventions to individual needs for effective language development in autistic children. The findings offer valuable insights for educators, policymakers, and parents invested in improving educational outcomes for children with ASD.

Keywords: Applied Behavior Analysis (ABA), Autism Spectrum Disorder (ASD), Picture Exchange Communication System (PECS), Teaching English

Teaching involves exchanging knowledge between educators and learners (Hughes & Greenhough, 2006; Linzalone et al., 2020; Lohman & Woolf, 2001). It also requires attentiveness to the needs, experiences, and emotions of others, providing assistance to help them understand specific topics and achieve greater comprehension. In particular, teaching and learning languages, especially foreign languages, can be challenging for students with special

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educational needs (Cooc, 2019; Jobling & Moni, 2004; Khasawneh, 2021; Norwich & Lewis, 2007). However, when learners become familiar with learning strategies, the process of language learning is facilitated (Zohrabi et al., 2018).

Children with ASD are among those with special needs who require additional attention and care. A substantial body of research highlights effective interventions for children and adolescents diagnosed with ASD (Juane Heflin & Simpson, 1998). Furthermore, these interventions have demonstrated their utility in supporting a diverse range of students across various educational settings (Koegel et al., 1999).

English proficiency is increasingly crucial in today's globalized world, driven by technological advancements and the 4th Industrial Revolution (Hariharasudan & Kot, 2018). Inclusive education will equip children with ASD with the skills necessary to thrive in this evolving landscape (Yunus et al., 2022).

Learning a second language (L2) presents a significant hurdle for learners with ASD, who may already struggle with communication in their native language (L1) (Barletta, 2018). A Malaysian study by Hashim et al. (2021) identified specific challenges faced by young autistic learners of English, including difficulties in acquiring vocabulary and initiating or responding to interactions, further complicating their learning. Despite these obstacles, the research by Elder et al. (2006), Petersen (2010) and Reppond (2015) suggested the potential for successful communication and education in a foreign or second language for children with ASD.

While research by Zohoorian et al. (2021) confirmed the feasibility of teaching English as a second language (L2) to children with ASD, they emphasize the importance of employing specific methods for success. These methods encompass various approaches: Behavioral and cognitive coaching (Anderson & Romanczyk, 1999; Khodaverdi et al. 2018; Schloss & Smith, 1998), Montessori-based vs. Audio-Lingual methods (Rezvani, 2020), and Individualized Education Plans (IEPs) with visual aids and co-teaching (Padmadewi & Artini, 2017).

The combination of Applied Behavior Analysis (ABA) and Picture Exchange Communication System (PECS) strategies appears to be a promising method for teaching English to children with ASD, given the strengths of autistic students in visual learning (Kuparinen, 2017; Schopler et al., 1995), and the effectiveness of these strategies in enhancing their social communication (Castillo & Sanchez, 2016).

Research on the combination of ABA and PECS strategies in teaching English alphabets, pronunciation, and words to autistic children is limited. While existing studies highlight the effectiveness of PECS in enhancing communication skills and social interactions, there is a lack of research focusing specifically on addressing its impact on foreign language acquisition, particularly in phonetic and alphabetic learning. Furthermore, the integration of ABA with PECS for structured language learning has not been extensively explored, leaving a gap in understanding how these combined strategies can optimize learning outcomes in English literacy. Investigating this intersection could provide valuable insights into tailored educational strategies for autistic learners.

Thus, this study specifically investigates the following research question:

Research Question: How can using a combination of ABA and PECS strategies improve an autistic child's learning of English alphabets, words, and their pronunciations?

Theoretical Background

Autism Spectrum Disorder (ASD) is a complex neurodevelopmental condition affecting the brain, presented in early childhood, and impacts individuals throughout their lifespan (Feinstein, 2012; MedlinePlus, 2021). Children with ASD exhibit a wide range of behaviors and challenges but commonly experience difficulties in social interaction and language development and demonstrate repetitive behaviors (Magyar, 2011). ASD fundamentally impacts how a person perceives and communicates, often leading to social interaction and information-processing challenges (Setiadi, 2017).

One of the key areas affected by ASD is language development. Limited social interaction hinders a child's ability to learn and interpret social cues, impacting various aspects of language, like grammar, conversation flow, and practical use of language (Setiadi, 2017). This can manifest as limited vocabulary, unusual speech patterns, and difficulty carrying on conversations. Communication difficulties, particularly regarding spoken language (pre-verbal, non-verbal, and verbal), pose a significant hurdle for autistic children (Santrock, 2007).

Due to the diverse challenges faced by individuals with ASD, various therapeutic approaches have been proposed to support them throughout their lives. Here's a brief overview of some common approaches:

- Structured programs like TEACCH (Treatment and Education of Autistic and Related Communication-Handicapped Children) provide a structured learning environment (Marcus & Schopler, 2007).
- Augmentative and alternative communication (AAC) systems like PECS strategy (Picture Exchange Communication System) and MAKATON (Margaret Walker (MA), Katherine Johnston (KA) and Tony Cornforth (TON)) can assist those with limited verbal skills (Trembath et al., 2007).
- Behavioral intervention through Applied Behavior Analysis (ABA) focuses on modifying behavior through positive reinforcement (Jensen et al., 2002)
- Communication interventions like speech therapy directly target communication skills (Pennington et al., 2004).
- Expressive therapies like music therapy can offer emotional and social benefits (Rodwin et al., 2022).
- Medical interventions may involve medication prescribed to address specific needs (Ryan et al., 2014).
- Mental health support through psychotherapy can provide support for emotional well-being (Warwick et al., 2008).

Applied behavior analysis (ABA) has emerged as a cornerstone of evidence-based interventions for children and youth with ASD. Over the past 40 years, ABA-based strategies have demonstrated success in reducing challenging behaviors while improving communication, social skills, intellectual functioning, language development, and daily living skills (Swanson & Sachse-Lee, 2000; Virués-Ortega, 2010). Typically implemented early in a child's development, these interventions provide comprehensive and individualized support, administered through individual or small-group modalities, often coupled with parent training (Virués-Ortega, 2010).

Beyond its direct benefits, ABA also facilitates inclusive education by enabling many students with autism to learn alongside their neurotypical peers (Dawson et al., 2012; Eapen et al., 2013). This is why ABA-based interventions are popular for educators, service providers, and parents in public schools seeking to support children with autism (Hess et al., 2008).

The core principle of ABA lies in understanding the relationship between what happens before a behavior (antecedent) and what follows it (consequence) (Alberto & Troutman, 1999; Sulzer-Azaroff & Mayer, 1977). This information is then used to design personalized programs that promote desired learning and behavioral changes. In simpler terms, ABA focuses on identifying triggers (antecedents) for a behavior and the outcomes (consequences) that follow it.

Professionals leverage the "ABCs of behavior" (Antecedent, Behavior, Consequence) framework to understand a child's behavior. This involves identifying triggers (antecedents), the behavior itself, and the resulting consequences (Sugai et al., 2000). By analyzing patterns and the underlying purpose of the behavior, providers can then select, teach, and reinforce a more appropriate replacement behavior that fulfills the child's needs. Research by Anderson and Romanczyk (1999) highlighted the importance of early diagnosis and consistent, structured ABA programs for significant progress in children and youth with ASD.

The research by Tri Gunadi (2019) aimed to determine whether implementing an ABA strategy can significantly improve language response abilities in young children with autism. Overall, the study concluded that ABA is an effective strategy for improving language development in young children with autism, suggesting that consistent application of this strategy can lead to meaningful advancements in communication skills essential for social integration and academic success. Furthermore, Adkins (2022) underscored that ABA therapy is a structured strategy aiming at improving behaviors and skills in children with ASD by reinforcing positive behaviors and reducing negative ones. He highlighted the critical role of the environment in shaping treatment outcomes, noting that consistent application of ABA across various settings—such as home, school, and community—enhances the generalization of learned skills. In conclusion, Adkin's (2022) study emphasized the importance of considering environmental influences when implementing ABA for children with ASD, advocating for a holistic strategy that ensures consistency and individualization to improve treatment effectiveness. Fitri (2024) also proved that ABA significantly enhances expressive and

receptive language skills among autistic children. The article highlighted the importance of individualized strategies, where therapy is tailored to meet the unique needs of each child, thereby optimizing language acquisition. Additionally, it suggested that understanding the cognitive processes involved in language learning can further enhance the effectiveness of ABA strategies. The conclusion underscored the need for continued research into combining ABA with other therapeutic strategies to maximize language development outcomes for children with autism.

Beyond ABA, research suggests promising alternative and complementary practices. These include peer-mediated intervention, where children with ASD learn from their neurotypical peers, and the use of visual supports like the Picture Exchange Communication System (PECS). Autistic children excel at visual learning and benefit from memorable experiences that engage multiple senses (Padmadewi & Artini, 2017). In this light, it might be argued that PECS is a communicational strategy that utilizes visual symbols to facilitate verbal expression (Bondy, 2001). According to this strategy, learning occurs through specific behaviors reinforced by rewards. In PECS, communication itself is considered a behavior (Bondy & Frost, 2011), and the system creates a speaker-listener dynamic through an exchange process (Frost, 2002). The child requests an item using a picture, and receiving the desired item serves as a reward, encouraging the repetition of the communication behavior.

Research overwhelmingly supports the effectiveness of PECS in fostering first-language communication for children with ASD. As McCorkle (2012) suggested, this strategy can help by "reducing reliance on areas of deficit" like auditory processing and spoken communication while capitalizing on their strengths in visual processing (p. 2). This aligns with research by Zohooriyan et al. (2021), who investigated the application of the PECS for teaching English vocabulary to children with ASD. The research involved two high-functioning children with autism, aged 9 and 12, enrolled in a special needs school. The findings suggested that PECS can be a useful tool for teaching English vocabulary to children with ASD, though it also highlighted the necessity of addressing individual challenges faced by participants during the learning process. Moreover, Tamanaha et al. (2023) evaluated a structured approach to implementing PECS in a school clinic setting. The study focused on children with non-verbal ASD or minimal verbalization, aiming to enhance their communication skills through a series of 24 sessions. Overall, the article underscored PECS as a valuable tool for enhancing communication among children with ASD but also pointed out the need for individualized assessment and support systems to maximize its effectiveness.

The Importance of English Language Learning for Children with Autism Spectrum Disorder (ASD)

In today's globalized world, being proficient in English is essential, and it is frequently taught as a second language from an early age (Kaprava, 2019). It bridges communication across cultures, impacting areas like education, technology, and global interaction. While this

presents opportunities for connection, learning a foreign language presents a unique challenge for children with ASD (Barletta, 2018). These challenges stem from communication difficulties inherent to ASD, which can make adapting to a new linguistic environment particularly stressful.

Despite these difficulties, research suggests that many children with ASD possess strong language skills, particularly in areas like vocabulary, sound production, and basic grammar (Samadi, 2013). However, they may struggle with spoken or written instructions and using language for social purposes (Barletta, 2018). Recognizing these strengths and weaknesses is crucial for educators to develop effective methodologies for teaching English to students with ASD.

This gap in methodology is further highlighted by the limited research on the intersection of learning disabilities and English language instruction for children with ASD (Fernandez et al., 2012; Hambly & Fombonne, 2012). While extensive research supports the effectiveness of ABA and PECS in promoting first-language communication for autistic children (Ganz & Simpson, 2004; Kravits et al., 2002), applying these strategies to teach English as a foreign language remains largely unexplored.

Building on this knowledge, this study investigates the potential of combining ABA and PECS strategies to improve an autistic child's learning of the English alphabet, words, and their pronunciation.

Method

Design of the Study

This qualitative study employed a descriptive case study approach to examine the progress of autistic children learning English vocabulary. Specifically, the research aimed to investigate the effect of combining two strategies (ABA and PECS) in engaging children with ASD in a foreign language.

Participant

The study involved a single participant, Erfan, an 8-year-old boy diagnosed ASD and Asperger's syndrome. He was selected utilizing purposive sampling. Erfan received speech therapy but still exhibited challenges with social interaction and communication. His native language was Azeri, and he had no prior English language learning experience. Erfan primarily used hand gestures and sounds to communicate, rarely spoke verbally, and struggled to make eye contact or initiate conversations.

Erfan also exhibited behavioral challenges, particularly disliking disruptions to routine and negative reinforcement (e.g., "your response is a mistake"). This likely contributed to his preference for nonverbal communication through gestures. He became upset and frustrated when mistakes occurred in class. However, he was described as intelligent and followed established routines well. Despite limited spoken language (using one or two words to answer

questions), his participation in the foreign language learning program offered promise for improving his communication skills and reducing his fear of making mistakes.

Instruments and Materials

The study employed a combination of PECS and ABA strategies to deliver English language instruction to Erfan. Training materials included a tablet with a relevant app (Let Me Talk), a laptop, colorful objects and pictures, and PECS tools already in use at the center. These tools were used to teach Erfan alphabets, numbers, and object recognition.

Positive reinforcement (in the case of ABA) in the form of candies, toys, or chocolates was provided when Erfan cooperated with the learning activities and responded correctly.

To assess Erfan's progress, the researchers produced three paper-based tests focusing on different aspects of language learning: pronunciation, recognition, and spelling.

Procedure

This study commenced with the establishment of a more comfortable and relaxed environment to enhance the participant's comfort level. To maintain Erfan's interest and prevent boredom, the researchers kept the sessions engaging and enjoyable. This involved a combination of play activities and positive reinforcement. A total of twenty-four sessions, each lasting an hour, were conducted to provide instruction on the English alphabet and vocabulary. It should be noted that each session had a duration of approximately four hours, but because teaching languages to autistic children can be troublesome due to autistic children's shorter attention spans or difficulty maintaining focus, sensory overload or discomfort in certain environments, which can limit the time spent on active learning, only one hour was allocated to practical teaching and learning activities. For three hours, the teachers tried to attract Erfan's attention. In every session, two letters or words were introduced. At the onset of every session, the two previously learned items were reviewed, and then the other two words were introduced. and finally, an evaluation of the newly learned words was followed at the end of every session. It must be noted that all the stages were presented in English language.

Teaching Alphabet

The research utilized elements of ABA and PECS strategies to teach Erfan the English alphabet, which lasted for thirteen one-hour sessions. Following ABA strategy, the researchers broke down alphabet recognition into smaller, more manageable steps. Each session focused on just two letters, introducing both their names and corresponding sounds. To enhance Erfan's understanding, the researchers incorporated visual learning strategies from PECS. This included using a special app called "Let Me Talk," common in Australian autism centers (*Apps for Individuals on the Autism Spectrum*, 2024), to present pictures and sounds for each letter. Additionally, the researchers created a multisensory experience with various colorful objects and pictures: animal pictures representing letters (as shown in Figure 1), manipulatives like

glue and scissors for crafting alphabet shapes, writing tools like pencils and crayons, and wooden alphabet pieces for tactile learning.

Figure 1.

Pictures of the Alphabets in the Shapes of Animals and Objects

Recognizing Erfan's potential for echolalia (repeating sounds), the teaching method emphasized an immediate repetition. Sounds were presented through the application, and Erfan was encouraged to repeat them. One more aspect of PECS involved prompting Erfan to identify learned letters in different environments. After practicing in the classroom, the researchers guided Erfan to a corridor where alphabet stickers were displayed (figure 2). This encouraged him to locate the previously learned letters in a new setting.

Figure 2

The Picture of the Corridor

Finally, the ABA's concept of prompting was used to aid Erfan in writing practice, which was used as a technique to pave the way. The researchers first bolded the faint letters on a worksheet, highlighting their shape. This provided a visual prompt to help Erfan understand the letter formation. Moreover, the researchers repeatedly called out each letter name to strengthen the association between letters and their sounds. This auditory reinforcement occurred while Erfan was writing it, aiming to draw his attention to the sounds he was forming during writing practice.

Additionally, the possibility of incorporating a laptop into the teaching sessions was being explored. Erfan displayed significant enthusiasm for using a laptop, likely due to the infrequent use of computers at the autism center. This enthusiasm presented an opportunity to integrate technology into the learning process. Erfan demonstrated significant engagement when working with the alphabet on a laptop or tablet. He learned to click on words to hear their sounds while proactively asking about letter names before doing so—indicative of developing literacy skills. In addition, Erfan's success with alphabet games on the laptop showcased progress in letter recognition and may indicate the emergence of early pre-reading abilities. He was able to connect the visual representations on the screen (letters and sounds) with the physical wooden alphabet pieces placed on his desk, as illustrated in Figure 3.

Figure 3

The Picture of Wooden Alphabets

The program acknowledged autistic children's preference for routine, particularly because Erfan disliked changes. Despite this, he thrived by learning and enjoyed making pictures and crafts using letters. After successfully learning the alphabet, the program transitioned to teach the words.

Teaching Words

In the subsequent eleven one-hour sessions, the researchers combined PECS and ABA strategies to facilitate word learning, starting with simple two- and three-letter words like "dad" and "cat" (Table 1). For example, the word 'dad' was broken down visually as 'd-a-d' to aid understanding for autistic learners. Upon viewing an image representing "dad," the participant engaged in a tactile and imaginative process. He formed a circular gesture with both hands, symbolizing a hug towards his father's figure. Subsequently, he began sketching a depiction comprising a person with a red heart, representing affection, alongside another figure with a beard, indicative of the paternal role. He started to say: Dad. Concurrently, he verbalized his understanding of the term, employing a combination of images and language in his expression. This illustrative approach enabled the participant to internalize the concept of "dad" through personal association and visual representation.

Table 1

More detailed information about the sample of taught words

Subject	The name of letters	The combination of letters	Time (minutes)	Method	Blending words
Animals	a-c-f-i-s-h-t n-w-d-e-f-y	C+a+t F+I+S+H A+N+T C+O+W D+O+G B+E+E F+L+Y B+E+A+R G+O+A+T H+O+R+S+E T+I+G+E+R	10 13 10 10 10 10 13 15 16 20 15	According to ABA, the teacher first taught the alphabet to him, then letter by letter made a word for him, and also started from the easier words to the hardest ones. As a result, he could gradually recognize and read English words In the second process, the strategy is PECS. These strategies use the Let Me Talk application or draw a picture. Using this strategy was so joyful for him, so this was the motivation to memorize and he could use them in the real world (when he was playing with his toys)	cat fish ant cow dog bee fly bear goat horse tiger
Body parts	e-y-a-r-m-e-a-r-f-c-	A+R+M E+Y+E E+A+R F+A+C+E	10 10 10	ABA+PECS	Arm Eye Ear face
Fruits	a-p-e-r-c	A+P+P+L+E G+R+A+P+E+S C+H+E+R+R+Y B+E+R+R+Y	10 15 10 10	ABA+PECS	Apple Grapes Cherry Berry
colors	r-e-d-b-l-u-w	R+E+D B+L+U+E Y+E+L+L+O+W	10 10 15	ABA+PECS	Red Blue yellow
objects	c-a-r-m-g-n-e-t	C+A+R M+A+G+N+E+T	10 15		Car magnet

At the onset of every session, the researchers conducted an English review of the participant's knowledge by prompting him to recall the previously learned words. Following this review, two new English words were introduced for instruction. The participant displayed enthusiasm and curiosity about English words and their visual representations. Recognizing the need for a more patient and detailed approach, the researchers gradually progressed to words like "banana" only after Erfan grasped shorter ones.

The program also incorporated plenty of visual aids, similar to those illustrated in Figure 4, and emphasized phonetic instruction to create a multisensory learning experience that was enjoyable and effective for autistic learners.

Figure 4

The picture of manual works

The researchers designed a visual learning program using PowerPoint to introduce English words, which prioritized multisensory learning for a well-rounded experience. Each word was introduced across 25 slides. Erfan began with simpler three-letter words and actively built them using two boxes of alphabet letters, both uppercase and lowercase, reinforcing the visual representation of the words. Each slide incorporated multiple learning methods, including auditory reinforcement through pronunciation sounds, visual context pictures to convey word meanings, and visual instructions that guided Erfan in writing the words, accompanied by cues such as images of a mouth. This provided repeated exposure to pronunciation, spelling, and meaning. Erfan actively participated by seeing and touching the letters while building the words, then followed visual instructions to practice writing them independently. He needed to demonstrate his understanding by correctly spelling and pronouncing each word for three consecutive days before moving on. If he struggled, the researchers revisited the word in future sessions. The one-on-one classroom environment—equipped with a desk, chairs, and a whiteboard—minimized distractions and maximized Erfan's focus to further optimize learning.

The researchers recognized parental involvement as a crucial factor in mastering this process. To foster this collaboration, they informed the parents about the specific words and pronunciations that Erfan had learned after each session. Additionally, the same homework was provided for both Erfan and his parents to work on together, ensuring continued practice and reinforcement outside of teaching sessions. To streamline this process and make homework easily accessible, a designated system using red folders was implemented to organize homework materials. Moreover, the program recognized that Erfan, as an autistic child, might face challenges. These could include making vague sounds, talking to imaginary people while

writing, or becoming upset and crying when mistakes were pointed out. To address these challenges, the researchers developed strategies such as calming techniques—like holding Erfan's hand—and incorporating his favorite games—such as the slide, swing, and toy cars—to create a more positive and supportive learning environment.

Finally, his progress was evaluated using three paper-based tests. Each test included a category of words (e.g., food, fruits, body parts). The first test required him to read and match words, implicitly testing pronunciation. The second test involved circling the correct word and assessing recognition skills. The final test challenged him to spell and write the words, assessing written production. During the tests, he was shown pictures or words previously taught and asked to pronounce them correctly.

Data Analysis

The data of this descriptive study were collected and assimilated from observation, taking notes, and giving three tests. It focuses on describing the success of the combined ABA and PECS strategies used to produce a method to teach Erfan the English alphabet and vocabulary. The analysis encompasses several key components: participant engagement, learning outcomes, and the impact of multisensory strategies.

Results

Table 2 indicates the successful development of the participant's reflective thinking abilities. He demonstrated proficiency in various tasks, including learning the alphabet, letter recognition, story comprehension, social interaction with peers, singing songs, and using various writing and crafting tools. Moreover, his performance in assigned tasks was closely monitored, with a focus on applying acquired skills in new contexts, such as spelling his name.

Table 2

Detailed information about the results of skills.

Alphabets	Session	Strategies	Know ABC- build letter recognition by listening, speaking, reading, and writing skills- sing songs about the letters,			Results						
			Thinking Skills							Four Skills		
			Before learning	After learning	Recognizing patterns	Applying knowledge	Matching	Imagining	Visual thinking	W	S	R	L
Aa-Bb	1	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓
Cc-Dd	2	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓

Alphabets	Session	Strategies	Know ABC- build letter recognition by listening, speaking, reading, and writing skills- sing songs about the letters,	Results									
				Thinking Skills						Four Skills			
Ee- Ff	3	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓
Gg-Hh	4	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓
Ii-Jj	5	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓
Kk-Ll	6	ABA+ PECS	0	Very good	Very good	Very good	Good	Very good	Good	✓	✓	✓	✓
Mm-Nn	7	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓
Oo-Pp	8	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓
Qq-Rr	9	ABA+ PECS	0	Very good	Very good	Very good	Very good	Good	Very good	✓	✓	✓	✓
Ss-Tt	10	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓
Uu-Vv	11	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓
Ww-Xx	12	ABA+ PECS	0	Very good	Good	Very good	Very good	Very good	Very good	✓	✓	✓	✓
Yy-Zz	13	ABA+ PECS	0	Very good	Very good	Very good	Very good	Very good	Very good	✓	✓	✓	✓

The participant faced challenges in expressing his wants and emotions, prompting the use of PECS as a strategy commonly used in ABA. This strategy proved particularly beneficial for nonverbal or minimally verbal individuals, allowing for gradual skill development. Through consistent practice, the participant expanded his vocabulary by learning and repeating new words.

It is worth mentioning that the participant had limited knowledge of Azeri and Farsi. We assessed the child's proficiency in Azeri and Farsi, which indicated that his existing language skills did not hinder his ability to learn English. We utilized structured interventions (ABA and PECS) specifically designed for teaching English vocabulary and alphabets. These evidence-based strategies were implemented in a way that prioritized English exposure during sessions. The focus on English during our interventions aimed to minimize any potential interference from his other languages. Despite hearing the English words, initially, the participant tended to refer to them in Farsi or Azeri. However, with repeated exposure and practice, he gradually began using the correct English pronunciation, indicating progress in language acquisition.

Nevertheless, the researchers found revisiting and reinforcing previously learned words necessary. In implementing the combination of ABA and PECS, the researchers consistently utilized reinforcement techniques to guide the participant's responses.

Subsequently, a comprehensive assessment was administered, consisting of three paper tests, each encompassing different word categories. The participant successfully answered and pronounced 88 out of 90 words, reflecting significant progress in language acquisition over three months. This achievement included mastering vocabulary related to objects, animals, body parts, food, fruits, numbers (0-10), and colors. Overall, this marked success underscored the effectiveness of the learning method employed. This is evidenced by the participant's ability to write his name, his family members' names, and the teachers' names.

Discussion

This study investigated the effect of combining ABA and PECS strategies to enhance learning English alphabets and words in an 8-year-old high-functioning boy with ASD , with the central research question being: "How can using a combination of ABA and PECS strategies improve an autistic child's learning of English alphabets, words, and their pronunciations?". The findings highlight the potential of these integrated strategies to address the unique challenges faced by children with ASD, particularly in language development, and directly answer this question through several key mechanisms.

First, the results support existing literature that recognizes ABA as a cornerstone intervention for children with ASD. Tri Gunadi (2019) confirmed that ABA significantly improves language response abilities in young children with ASD, emphasizing the importance of consistent application for meaningful advancements in communication skills. The structured nature of ABA, which focuses on modifying behavior through positive reinforcement, aligns well with the needs of children with ASD, who often require clear and consistent frameworks for learning. In this study, ABA principles were crucial in establishing routines, reinforcing correct responses, and systematically shaping the participant's learning of English alphabets, words, and pronunciations. This structured approach provided a predictable environment that reduced anxiety and promoted focused attention, thereby facilitating learning.

In conjunction with ABA, PECS serves as a valuable augmentative communication tool that capitalizes on the participant's visual strengths and reduces reliance on auditory processing, which is often a challenge for individuals with ASD (Allred, 2014). As McCorkle (2012) noted, PECS can reduce reliance on auditory processing and capitalize on visual strengths, facilitating communication for children who may struggle with spoken language. Erfan's progress in recognizing letters and learning vocabulary through PECS illustrates its effect in fostering foreign language communication, reinforcing the findings of Zohooriyan et al. (2021), which indicated that PECS can effectively teach vocabulary while addressing individual learning challenges. PECS provided a concrete, visual means for the child to request and label items, thereby enhancing his understanding and use of English vocabulary. The multi-phased

approach of PECS, starting with basic communication and progressing to more complex sentence structures (Parekh, 2024), allowed the participant to gradually build his expressive language skills in English. The fact that the participant achieved a vocabulary of 30 words within three months demonstrates the effectiveness of PECS in facilitating rapid vocabulary acquisition. This tailored approach facilitated the child's understanding of written language and fostered his ability to comprehend stories and develop social skills.

Furthermore, the combination of ABA and PECS fostered improved pronunciation skills, directly addressing another component of the research question. The ABA techniques, such as shaping and prompting, were used to encourage correct pronunciation of English words, while PECS provided visual support that reinforced the association between the written word, its meaning, and its spoken form. This multisensory approach – combining visual, auditory, and tactile cues – was particularly beneficial for the participant, who, like many children with ASD, benefits from learning strategies that engage multiple senses(Allred, 2014).

Fitri (2024) emphasized that ABA therapy should be customized to optimize language acquisition, a principle that was evident in this case. By integrating ABA and PECS, the intervention was able to address both behavioral and communicative aspects of learning, providing a holistic approach that catered to the participant's specific challenges. Moreover, Tamanaha et al. (2023) pointed out that successful implementation of PECS requires individualized assessment and support systems. While formal measures of emotional engagement were not employed in this study, improvements in social skills and behaviors indicative of emotional engagement in the participant aligned with these individualized strategies, suggesting that personalized interventions can lead to more effective outcomes. Specifically, increased eye contact, reduced prompting needed for PECS exchanges, and spontaneous attempts to use newly learned English words were noted, indirectly suggesting heightened engagement and motivation.

In brief, this case study demonstrates that the combination of ABA and PECS can be a powerful approach to improving English language skills in children with ASD. By leveraging the structured teaching methods of ABA and the visual support of PECS, this intervention addressed multiple facets of language learning, including vocabulary acquisition, pronunciation, and functional communication. The findings underscore the importance of individualized assessment, tailored intervention strategies, and a multisensory approach to maximize learning outcomes for children with ASD learning a foreign language.

Conclusion

This case study investigated the effect of combining ABA and PECS in teaching English language skills to an 8-year-old boy with high-functioning ASD at Sara Autism Center. The study underscored the importance of multimodal learning approaches that leverage the strengths of children with ASD, particularly their visual learning capabilities. The successful use of the Let Me Talk app on an iPad not only supported communication but also emphasized the role of

technology in enhancing their educational outcomes. Furthermore, the results reinforced the necessity of tailoring interventions to meet individual needs, ensuring that each child of autism receives personalized support that aligns with their unique challenges and strengths. The study also highlighted the effect of the PECS strategy in addressing difficulties in expressing wants and emotions (observed), a common challenge in children with autism. By facilitating non-verbal communication and gradually introducing verbal elements, PECS provided a structured way for the participant to communicate his needs and feelings (observed), contributing to a more comprehensive developmental progress. Parental involvement through structured homework sheets was another critical factor in reinforcing vocabulary retention and ensuring the continuity of learning outside the structured sessions that emphasizes the role of family engagement in the success of language and communication interventions for autistic children. The initial reliance on Farsi or Azeri terms, which decreased with repeated exposure to English words, highlights the challenges of alphabetical letters and words and their pronunciation in children with autism. The participant's eventual success in predominantly using English words suggests that with consistent and structured exposure, bilingual children can achieve proficiency in both languages. The comprehensive assessment results, where the participant correctly answered 88 out of 90 words, underscore the significant progress made in language acquisition. This high level of accuracy demonstrates the effectiveness of the ABA and PECS strategies in achieving substantial learning outcomes within a relatively short period.

The findings have broad implications for teaching English as a second language (L2) to children with ASD. The globalized context necessitates proficiency in English, yet many autistic children face unique challenges in adapting to new linguistic environments due to their inherent communication difficulties (Barletta, 2018). The significant increase in vocabulary observed in the participant underscores the effect of combining ABA and PECS strategies as a multimodal approach to language acquisition. This suggests that educators can consider integrating these strategies into their curricula when teaching foreign languages to children with ASD. By leveraging visual learning strengths through PECS and reinforcing language skills using ABA, educators can create a more inclusive and effective learning environment that accommodates the unique needs of autistic learners.

The use of the Let Me Talk app on an iPad as a communication support tool highlights the potential benefits of incorporating technology into language education for children with ASD. The finding encourages further exploration of digital tools that can facilitate communication and learning. Educators and parents may be encouraged to utilize such applications to enhance engagement and provide additional support for language development.

The study underscores the necessity of individualized assessment and support systems to maximize effectiveness and meet the unique needs of each child. Additionally, it emphasizes the necessity of tailoring interventions to meet individual needs. Given that children with ASD have varied responses to PECS, with some showing increased communication and others demonstrating limited joint attention, the intervention must be tailored. Preference assessments

are critical to identifying motivating stimuli, thereby optimizing engagement and learning for each child. In this article, the participant's success illustrates that personalized approaches can lead to meaningful advancements in language skills. Policymakers and educational institutions can prioritize individualized education plans that incorporate evidence-based practices like ABA and PECS, ensuring that interventions are adapted to every autistic child's strengths and challenges.

Although some predictable expectations and specific requirements may be common among this population, extrapolating these findings to a larger autistic student body remains inadvisable. Therefore, any English language teaching program designed for autistic learners can undergo meticulous planning informed by a comprehensive investigation of individual student preferences. The techniques explored within this study, while not exhaustive, offer a valuable foundation. However, for successful implementation, these strategies should be meticulously selected and tailored to not only reflect the students' interests but also consider their current dispositions. This study contributes valuable insights into understanding how bilingual children with ASD can benefit from targeted interventions for learning additional languages. However, further research is warranted to explore these dynamics more comprehensively.

While the current case study yielded promising results and suggested that foreign language instruction can benefit children with ASD, it is crucial to acknowledge the limitations of generalizability. As this research highlights, the needs of learners on the spectrum are highly individualized.

Finally, this research has a number of limitations, some of which constitute useful avenues for future research on the intersection of ABA, PECS, and foreign language education. Since it focused on teaching a small set of English words and pronunciation, excluding other aspects of the language, and involved only one child under ten years old, the results may not apply to teenagers and adults. Further research is needed to explore the long-term effects of such interventions and their applicability across diverse settings and age groups. Additionally, understanding cognitive processes involved in language learning can inform future strategies that combine ABA and PECS with other therapeutic approaches, potentially leading to even greater advancements in communication skills for children with autism. Despite these limitations, the research paves the way for further exploration of effective English language learning methods for autistic children. These insights can contribute to a more inclusive and successful learning experience for autistic students.

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