

Teachers' Perceptions towards Picture Exchange Communication System (PECS) Strategy and the Effects on the Achievement of Students with Autism in Learning Communication Skills

April Dream C. Abono^a, Wenefredo E. Cagape^b, EdD, PhD,
Catherine L. Rubillar^c, Maria Riena D. Saturos^d,
Jineth D. Taniongon^e, Rosie Lyn G. Tuba^f

*adcabono02070@usep.edu.ph^a, cagapefred@gmail.com^b, clrubillar01831@usep.edu.ph^c,
mrdsaturos02049@usep.edu.ph^d, jdtaniongon01813@usep.edu.ph^e, rlg tuba01812@usep.edu.ph^f*

^a Virtual Assistant at Amazon.com

^b OIC – College President, City College of Davao, Davao City 8000 Philippines

^c SHS Teacher III, Catalunan Pequeño National High School, Davao City 8000 Philippines

^d JHS Teacher, Catalunan Pequeño National High School, Davao City 8000 Philippines

^e Accounting Clerk at TEFASCO Ilang Davao City Davao del Sur 8000, Philippines

^f Administrative Coordinator, Hackett Security Agency, 726 Veloso St., Barrio Obrero, Davao City, Davao Del Sur 8000, Philippines

Abstract

Communication is one very important skill every human should acquire. It is important because as social beings we use it to connect to the people around us and our environment. However, communication is a great challenge to people who have a cognitive communication disorder like those with Autism Spectrum Disorder. Hence, many strategies are already developed to help those on the spectrum learn how to communicate. One of these is the Picture Exchange Communication System or PECS. Since the implementation of Inclusive Education worldwide PECS is also one of the strategies teachers use to effectively teach communication to children with autism. This study aims to determine the Teachers' perceptions of the Picture Exchange Communication System strategy and the effects on the achievement of students with autism in learning communication skills in two Schools in Davao City. The study utilizes the descriptive-predictive research design with fifty (50) public school teachers as respondents using purposive sampling. A researcher-made questionnaire was utilized to gather data on teacher's perceptions of PECS and its perceived effectiveness. Through regression analysis, the study revealed that teachers have high favor in the use of visual support like PECS, in enhancing communication skills in students with autism. The findings highlight the effectiveness of gradual communication development, visual aids, and illustrations in articulating needs and desires. Additionally, the study emphasizes the positive influence of PECS on initiating communication and fostering social interaction among students with autism. With that, it is highly recommended that the higher officials of the Department of Education organize proper teacher training to effectively use PECS to be able to maximize its full potential in developing communication skills for learners with autism. Also, recommendations include early integration of visual supports, emphasizing visual aids and illustrations, promoting gradual communication development, and focusing on initiative and social interaction. The study contributes valuable insights to the field of special education, providing a foundation for informed pedagogical practices and targeted interventions to optimize communication outcomes for students with autism.

Keywords: Autism; Picture Exchange Communication System; Sped Teachers; Inclusive Education

1. Introduction

The study aims to investigate and analyze teachers' perceptions towards the Picture Exchange Communication System (PECS) strategy and its effects on the achievement of students with autism in learning communication skills. The motivation behind this study stems from the growing acknowledgment of the difficulties encountered by students diagnosed with autism spectrum disorder (ASD) in developing effective communication abilities, a

Communicating effectively is one of the characteristics of humans that drastically help us facilitate social interaction, understanding, and emotional expression. Communication is one skill humans should develop because it is the foundation of all human relationships. It is said that we are born to communicate; it is in our DNA. Communication is used to express our feelings and maintain common attention ("Origins of Human Communication." MIT Press. Retrieved 2016-02-09). Thus, to some of us, communication development is a natural drive; the moment we are born, we already recognize our mother's voice (Graven et al., December 2008), and as we grow, the process of learning to communicate is natural. Language acquisition is a result of a process of interaction between mother and child which begins early in infancy, in which the child makes as important a contribution as the mother". (Snow, 1977a). Language development is vital to a child's ability to express feelings and communicate. One of the early language developments in children is using gestures and vocalizations to make their intentions known to others (S. Kang, 2016). Communication is also a way to socialize, for socialization is a dynamic communication process influenced by both individual and personal factors also personal influences, namely the personal reception and interpretation of all social messages and the dynamics and content of social influences (Maria Pescaru, 2018). Nevertheless, acquiring a language is a gradual process where mere practice and skills may not be adequate for developing effective communication. It requires not only proficiency in vocabulary and language but also a broader comprehension of how to engage in positive interactions with others through non-verbal cues and spoken and written language. However, for children with special needs, it is a crucial part of their development; one of those is the children with Autism. *Autism* is defined as persistent deficiency in social interaction and social communication across multiple contexts, as manifested by the following": deficits in nonverbal communicative behaviors, in social-emotional reciprocity used for social interaction, and in developing, maintaining and understanding relationships (DSM-5, 2013). Having said that, children with autism find it difficult to develop speech and language skills compared to those children who do not have autism. Children with ASD have difficulties in social interaction and communication. They find daily tasks and activities frustrating. They have limited attention span and interest, follow instructions, and only adhere to repetitive routines (Hus Y, Segal O. 2021)

In a typical child, learning to communicate is natural, but in children with special needs like Autism Spectrum Disorder (ASD), it is not that easy. For children with special needs, who often face unique challenges in communication, the acquisition of effective communication skills is a critical milestone in their developmental journey. Many researchers have given evidence that the development of communication in children with autism has a delayed pattern compared to children with typical development (Charman et al., 2003; Luyster et al., 2007; Weismer et al., 2010). Thankfully, today, many strategies and interventions are developed to teach children with special needs how to communicate, and one of these is the use of (PECS) or Picture Exchange Communication System PECS (Picture Exchange Communication System®) is a special alternative/augmentative communication system established in the USA in 1985 by Andy Bondy, Ph.D., and Lori Frost, MS, CCC-SLP. PECS was first implemented with preschool learners with autism at the Delaware Autism Program. Since that time, PECS has successfully been implemented nationwide with thousands of learners of all ages with different physical cognitive, and communication disabilities.

The PECS strategy protocol is based on B.F. Skinner's published book, Verbal Behavior and Broad Spectrum Applied Behavior Analysis. Specific reinforcement and prompting strategies that will lead to independent communication are used throughout the setting. The arrangement of tasks also includes systematic error correction procedures to promote learning if an error occurs. Verbal prompts are not used, which builds immediate initiation and avoids prompt dependency. This research will delve into teachers' perceptions of the PECS strategy, exploring their attitudes, beliefs, and experiences in implementing this communication intervention in the classroom setting. The study will also examine the perceived effects of PECS on the development of communication skills and overall achievement of students with autism. By gaining insights into teachers' perspectives, the research aims to contribute valuable information that can inform educational practices, curriculum development, and support systems for students with autism.

The importance of communication skills for children with special needs resonates worldwide. Globally, there is a growing recognition of the rights of children with disabilities, as articulated internationally such as the United Nations Convention on the Rights of Persons with Disabilities (UNCRPD). It is already known worldwide that all individuals with disabilities have the right to education, which is now what we call inclusive education, where these children also have full access to what other typical learners also have (United Nations International Children's Emergency Fund [UNICEF], 2017; Reid et al., 2018). This recognition extends to the right to

communicate effectively, access education, and participate in society on an equal basis with others. Ensuring that children with special needs can communicate not only promotes their well-being but also aligns with broader goals of inclusivity and equity in society. In line with the worldwide implementation of inclusive education, we have already embraced it here in the Philippines many years ago. Our government has already mandated the Department of Education and made RA 11560, where all students with disabilities, whether enrolled in private or public schools, shall be granted reasonable accommodation and services as based on the Individualized Education Plan (IEP) and shall have the right to use the appropriate support and related services. However, since we have just started adjusting to I.E., teachers are still facing challenges in accommodating the special needs of these children on the spectrum. Local concerns surrounding the communication skills of children with special needs are influenced by a multitude of factors, including cultural norms, educational resources, healthcare infrastructure, and policy frameworks. The extent to which children receive appropriate interventions and support for communication development can vary significantly from one community to another. Local contexts may also shape the availability of trained professionals, funding for special education programs, and access to assistive communication devices. Understanding these local concerns is essential for tailoring communication interventions to the specific needs and challenges faced by children in different regions.

Moreover, the study aligns with broader educational goals of inclusivity and tailored support for diverse learners. Understanding how teachers perceive and implement the PECS strategy can provide valuable input for refining and optimizing the use of alternative communication methods in special education contexts. Ultimately, the findings of this research endeavor to provide the improvement of educational outcomes and the overall well-being of students with autism by addressing their specific communication needs through evidence-based strategies.

1.1 Statement of the Problem:

- What is the Perception of Teachers regarding the Use of the PECS Strategy for Teaching Communication Skills to Students with Autism?
- What are the communication skills of students with Autism as perceived by teachers?
- Is there any significant effect of teachers' perception of the PECS Strategy on the communication skills of students with autism?

1.2 Statement of Hypothesis

There is no significant effect of teachers' perception of the PECS Strategy on the communication skills of students with autism.

1.3 Review of Related Literature

The goal of this study is to assess the usefulness of PECS, also known as the strategy of using pictures and images as a tool to communicate with children with ASD, which teachers use to assist children with unique difficulties with their communication abilities. We reviewed some studies that implemented PECS on individuals with special needs to determine the effectiveness of the interventions.

The Right to Education. To be able to receive Education and learn formally is essential and a right of every living person supported and found in three international human rights treaties: ("CRC," 1989) the Convention on the Rights of the Child, ("ICESCR," 1966) the International Covenant on Economic, Social and Cultural Rights, and ("CRPD," 2006) the Convention on the Rights of Persons with Disabilities. Globally, Inclusive Education has been embraced to abide by these laws. IE paved the way to developing fairer and more inclusive societies, resulting in many people opening their minds in the context of Inclusion, like both typical and atypical learners learning together in one classroom, in one environment (Committee on the Rights of Persons with Disabilities, 2016; United Nations International Children's Emergency Fund [UNICEF], 2017). Inclusive Education has been acknowledged worldwide; however, there is no universal concept for it. Its main essence is that everyone is welcome to the general education system to learn whatever their abilities, special needs, and differences may be. It is a way where the school, activities, and programs are formatted to respond to every special learning need by providing enough support and removing barriers to participation for all students (Inclusive Education Canada, n.d.; United Nations Educational, Scientific and Cultural Organization, 1994). Teachers are the main practitioners, and they are expected to adapt to implementing inclusive education as well. They are the captain of the ship, and they must lead the way for us to reach our goal. The goal is that one day, learners will be able to achieve their full potential, whether they are on the Spectrum or not. The road to this is long and challenging, yet teachers are so open-minded that they believe it's achievable. Now, teachers are faced with challenges to cater to the different needs of diverse learners

inside the classroom. Children with autism sometimes face the (ASD) of joining a general classroom. Autism Spectrum Disorder (ASD) in the recent decade has been increasing rapidly in the number of children with autism worldwide (Hasan, 2020). Some of these children with highly functioning autism are getting integrated into the mainstream educational systems (Jelinkova, 2019).

Autism Spectrum Disorder (ASD). Autism or autism spectrum disorder (ASD) causes students to develop more slowly than typical students. Autism is characterized by enduring impairments in social communication and interaction across various situations, as evidenced by deficiencies in social-emotional reciprocity, nonverbal communicative behaviors employed for social interaction, and challenges in establishing, sustaining, and comprehending relationships. (DSM-5, 2013). Studies indicate that the origins of autism may genetic factors, complications during pregnancy, birth-related issues, as well as other health conditions or diseases that may arise during developmental stages, but there is no definite reason as to why a child becomes autistic. (Lu J., Wang Z, Liang Y., Yao P. 2022; 14(2): 1136–1145). It is called a “spectrum disorder” because it consists of a wide range of symptoms, skills, and levels of impairment. People with autism may have varying strengths and challenges, and their experiences can be quite diverse. The latest research in 2023 from the CDC shows that one (1) in thirty-six (36) children is now diagnosed with autism. This is an increase from one (1) in forty-four (44) children two years ago. It would suggest an increase in the reported prevalence of autism in the United States. (e Department of Health statistics show that Filipinos with autism constantly increased in number from 500,000 in 2008 to 1,000,000 in April 2018 using just limited statistical tools. As Senator Zubiri noted it consistently climbed up over the past 10 years. (Manila Bulletin, TORREGOZA H., 2023).

Children with ASD have difficulty in cognitive processing development according to development assessment (Li et al., 2019). When a child has difficulty in their cognitive development it is more likely that there is a delay in acquiring knowledge. Cognitive development means how children explore, think, and figure things out. It is the development of knowledge, skills, dispositions and problem-solving, which help children to think about and understand the world around them. Brain development is part of cognitive development (Jean Piaget, 1920). One of the skills they have difficulty acquiring is Language development. Children with ASD are usually delayed in the development of language (Lord, Risi, & Pickles, 2004). Having this learner join a regular class can be challenging for teachers to accommodate their special needs. And so teachers are tasked to find strategies to connect with these learners and help them learn together with the other students. We are all aware that students usually spend most of their time between school and home. A student spends at least 6 hours in school. If they are not in school they are at home, and so students should learn communication both in school and at home to be effective in communication. One of the strategies to use to teach communication that involves both the school and home is the Picture Exchange Communication System (PECS)

Picture Exchange Communication System (PECS). Children with autism have difficulty with verbal and nonverbal communication, which may cause delayed or limited speech development; using alternative communication methods like augmentative and alternative communication (AAC) or sign language devices is one of the ways to bridge the Gap. One example of an AAC device is the Picture Exchange Communication System (PECS). It is an approach that is based on behavioral analysis. It is a meaningful communication that will encourage the child to initiate first. It focuses on the exchange through which the child learns words to communicate, like interacting and starting a conversation (Baker, 2007). Research findings (e.g., Bock, Stoner, Beck, Hanley, & Prochnow, 2005; Ganz et al., 2004; Frost & Bondy, 2002; Horton, Matteo, Waegenare, Frost, 2008; Kravits, Kamps, Kemmerer, & Potucek, 2002) indicate that PECS serves as a communication tool, empowering students lacking functional communication skills to engage with others. PECS was developed specifically for children with ASD for the reason that they display excellent visual memory and can learn rote memorization quickly. Children with autism are highly visual thinkers, they can process information that is incorporated with visual support at a swift pace meticulously in performing tasks making sure all is perfect (Heflin et al., 2007). Research results show in Pyramids Educational Consultants (2009) that PECS is not only effective with children with ASD but also effective for children with other disabilities who have communication deficits.

Visual Supports. Cook, K.T., Ganz, J.B., and Earles-Vollrath, T.L. book “How to Develop and Implement Visual Supports” 2006, Pro-Ed., Inc. of Austin, Texas, discusses the importance of incorporating visual support into the educational setting for children with autism spectrum disorder (ASD) to improve their learning and communication experiences. However, it may also be utilized with any child regardless of intellectual capacity. According to P. Dallas (2019), visual supports can be used in a variety of ways, but they are most commonly used to develop experiences and instructions, assist children in grasping expectations, and allowing children to express their feelings and thoughts. It also reveals that visual supports are handy for individuals with ASD, whether they are high-

(Railyn, 2016) Also argued that the use of visual aids helps bring the real thing closer to the students, where the learning process becomes more natural and realistic as well as easy for students to form mental images of abstract ideas.

Gradual Communication Development. (PECS) Picture Exchange Communication System is designed to help aid in the communication skills of children with ASD (Lori Frost and Andy Bondi, 1985) through understanding that each child progresses at their own pace by assessing the child's progress and adjusting the PECS system accordingly. (Magiati, et.al 2003). There is a gradual increase in communication development as perceived by teachers while using PECS on children with autism. Notably, the students can actively participate in classroom activities, express their thoughts, and make choices while using PECS, which leads to a positive and supportive learning environment. Students with ASD gain a reliable method to convey their needs, wants, and feelings that turn out to lead to improved behavior and engagement in learning cited in the study of Martin, 2016, that functional communication skills in PECS would enable them to express their most fundamental needs and desires effectively. Depending on their developmental and operational levels, students differed in their level of mastery of these abilities.

Parents express optimism about utilizing PECS to aid in the progress of their children with ASD. Additionally, a favorable correlation was observed between the implementation of PECS and enhancements in communication, learning, and social skills among children with ASD. (Mohammed F Safi et al. BMC Psychol. 2022.) Luigi, 2012 as cited by Craig, 2017 published research on social communication in children with autism spectrum disorder (ASD). The results of this study indicate that PECS provides a better understanding of the functional profile of children with ASD based on their social communication abilities. However, children with greater severity of social communication showed more difficulty in adaptive behavior and psychoeducational profiles.

Emphasis on Initiation and Social Interaction. Charlop-Christy, et.al 2013 in their paper "Using the (PECS) with Children with Autism: Assessment of PECS Acquisition, Speech, Social- Communicative Behavior, and Problem Behavior noted that the picture exchange communication system (PECS) is frequently used with children with autism as an augmentative communication system (Bondy & Frost, 1994; Siegel, 2000; Yamall, 2000). While PECS is frequently used in clinical settings, there is a lack of well-controlled empirical investigations to assess its effectiveness. Employing a multiple baseline design, the research investigated the acquisition of PECS in three children with autism. Furthermore, the study explored the impact of PECS training on the development of speech in both play and academic settings. The findings are discussed in relation to offering empirical support for PECS and highlighting the positive side effects associated with its implementation. Charlop's study is similar to the present one since both discuss the effectiveness of PECS. However, the former study made use of interviews in gathering data while the latter used a standardized questionnaire design. In Addition L. Kaduk (2019) the communication skills of the child with autism spectrum disorder were improved after PECS was implemented. And increase social interaction with fellow children. The benefits and improvements of using PECS as a teaching strategy encourage the child to communicate well eventually.

Many studies show that PECS demonstrated improvements in many students with special needs and showed significant development in their social communication skills (Kravitz et al., 2002; Lerna et al., 2012; 36 Lerna et al., 2014; Schwartz et al., 1998; Yoder & Lieberman, 2009).

Communication skills of Learners as perceived by teachers. The majority of learners with Autism Spectrum Disorder have delays or do not quickly develop language and speech to functionally meet their daily needs (Ostryn et al., 2008). However, since the discovery of using images when teaching, children with autism have had the hope of developing language. One of these strategies is the Picture Exchange Communication System (PECS), a widely used AAC intervention created by Andrew Bondy and Lori Frost in 1994. It mainly uses pictures in teaching communication to students with autism. It is a widely used strategy by teachers (Meredith, 1947). It has proven to be

the most effective intervention to develop social and communication (PECS) specifically nonverbal, in children with autism (Preston and Carter, 2009). In the classroom, incorporating images in teaching helps arouse the interest of the students' minds. Aside from being an effective strategy for developing language and communication skills, using Visual representations in the classroom provides a deeper understanding for learners. This makes them participate and encourages communication with the whole class Fish, Mun, and A' Jontue, (2016). Visual aids are essential in teaching as they promote interest in the learning process and make it, easier to understand the lesson which makes permanent retention of the lesson and eventually increases their vocabulary (Shabiralyani et al, 2015).

Correlation of the use of PECS and communication skills. Studies show that children with autism do best in learning where PECS are used. This might include cards with pictures, photos of their favorite toy or food, or symbols. These visual tools are useful for asking them things, commenting on things, and answering questions. For instance, using emotion cards will help them know the different emotions and feelings and use them to express and explain how they feel inside if they struggle to find words to communicate. (Sam et al., 2019). PECS is particularly beneficial for non-verbal or minimally verbal children, helping them initiate communication and reduce frustration. Research consistently shows that PECS leads to improvements in functional communication. (Brady et al., 2015)

Study results state that children with autism spectrum disorder (ASD) frequently employ the Picture Exchange Communication System (PECS) as a means of effective communication. Although a (Kravitz et al., 2002; Lerna et al., 2012; 36 Lerna et al., 2014; Schwartz et al., 1998; Yoder & Lieberman, 2009). large body of evidence suggests that PECS is an effective intervention for kids with ASD (e.g., Wong et al., 2015), but little is known about the most effective ways to teach parents to encourage their child's use of PECS.

1.4 Theoretical Framework

This study is guided by the principles of Behaviorism or the behavioral learning theory, founded by John B. Watson (1878-1958), B. F. Skinner (1904-1990), and Ivan Pavlov (1849-1936). Behaviorism is a branch of psychological research that concentrates on the observation and analysis of how behavior is influenced by controlled environmental changes. The goal of behaviorist teaching methods is to manipulate the environment of a subject, to change the subject's observable behavior, according to John B. Watson.

In addition, the Picture Exchange Communication System or PECS is based on B.F. Skinner's Operant Conditioning Behavioral Learning Theory, according to him, is when a person is first exposed to a stimulus, which prompts a response, and the answer is then reinforced. That is what conditions our behavior. Simply put, operant conditioning proposes that learning and changes in behavior occur through reinforcement and punishment. Reinforcement enhances a response, increasing the likelihood of the behavior repeating in the future. In contrast, punishment diminishes a response, reducing the likelihood of the behavior recurring. This perspective was pioneered by B. F. Skinner (1904-1990). Similar to the PECS protocol, Verbal Behavior, as outlined in the book, employs distinct prompting and reinforcement strategies aimed at fostering independent communication. The protocol incorporates systematic error correction procedures to enhance learning in the event of an error. Notably, it refrains from using verbal prompts, fostering immediate initiation and preventing dependence on prompts.

2. Methods

This section presents the research design, participants, instrument, data measures and data analysis, and ethical considerations in conducting this research.

2.1. Research Design

This research employs a descriptive-predictive design, utilizing a self-constructed Likert-scale questionnaire, to delve into teachers' perceptions of the Picture Exchange Communication System (PECS) strategy and its potential effects on the achievement of students with autism in learning communication skills. The customized questionnaire, designed to capture nuanced insights, aims to quantitatively assess educators' attitudes, beliefs, and experiences with PECS implementation. By combining a descriptive analysis of current perceptions

2.2 Population/Respondents

The study involved 50 teachers from two schools in Davao City. These schools are known for their commitment to inclusive education and welcoming students with special needs. These 50 teachers work in special education and inclusive classrooms, bringing experience in teaching students with autism who have used the PECS strategy. They were chosen purposefully to offer diverse viewpoints. Researchers set inclusion criteria, making sure the respondents are teaching and handling children with special needs. In addition to that, the respondents were asked about the years they taught children with special needs. Illustrated in Table 1, School A contributed 25 respondents, while School B also had 25, making a total of 50 teacher-respondents for this study.

Table 1. Distribution of Respondents of the Study

School	Total Number of Teachers	Total Number of Sampled Teachers
A	25	25
B	25	25
Total	50	50

2.3 Data Gathering Procedure

The first step made in this study to gather data is sending a letter of request by researcher 3 to the office of the Schools Division Superintendent (SDS) of Davao City. Upon approval, the researcher forwarded an endorsement letter from the SDS to the School Heads of the Identified teachers. Also as part of the formality, the researchers gave a letter of consent to each participant. In the letter, the teachers were assured of the utmost confidentiality of their responses. Following that, the researchers are then allowed to administer the questionnaire to the teachers. The researcher set a time with each participant to personally give the questionnaires. The respondents answered by simply putting a checkmark on the desired box that corresponds to their knowledge and experience stipulated on each item. After getting all the responses, the researchers used Microsoft Excel for all the data. The encoded data was then transferred to IBM SPSS 25 for statistical analysis.

2.4 Data Gathering Instruments

The researcher made use of a self-made questionnaire based on the use of PECS in teaching communication and its effect on the achievements of students with autism as perceived by the teachers. The questionnaire is a Likert scale type and consists of twenty-five (25) questions to measure agreement or disagreement with statements with the goal of quantifying responses. It is made up of different sections, like demographic information, teacher experience with PECS, perceptions of its effectiveness, and perceived impact on students' communication skills. After formulation of the questions, the questionnaire was submitted for approval and validated by three (3) experts in the fields of Linguistics, Mathematics, and Special Education to make sure the questionnaire was in tune with the study, especially the SOP. After it was successfully validated, the survey questionnaire was piloted to thirty (30) teachers to check its reliability. It was then checked for reliability using Cronbach's alpha. As a result, It shows that all items in the Teachers' Perceptions of Picture Exchange Communication System (PECS) Strategy and the Effects on the Achievement of Students with Autism in Learning Communication Skills got (0.976 reliability index) passed the required standard, considered as reliable.

2.5 Data Analysis

The research is conducted with comprehensive data analysis on the survey responses collected from the

The objective was to determine the perception of teachers regarding the use of the PECS Strategy for Teaching Communication Skills to Students with Autism. Based on the data collected, a Descriptive-Predictive design was utilized to analyze the results. Descriptive was used to investigate teachers' beliefs, attitudes, and experiences on implementing the PECS Strategy, which also includes general satisfaction, challenges, and perceived benefits. This also was used to assess the observable effects and the outcomes on the communication skills of students with autism. In predictive analysis this research employs regression modeling to point out the correlation between teachers' perceptions, their implementation practices of the PECS strategy, and the resulting student outcomes. This aims to foresee potential future trends in the effectiveness of the PECS strategy based on the relationships identified in the regression analysis.

3. Results and Discussion

3.1 Visual Supports

Presented in Table 2 is the level of teachers' perception regarding the use of the PECS strategy for teaching communication skills to students with autism in two Schools in Davao City in terms of using of visual supports. It reveals that the statement "Seeing that using pictures helps my students with autism express themselves more easily" obtained the highest mean value among the five (5) statements ($X=4.66$, $SD=0.47$), which is described as "high". On the contrary, the statement "Using visual aids in teaching communication to students with autism to get their attention and focus" obtained the lowest mean value among the five (5) statements ($X=4.00$, $SD=0.92$) which is described as "high". Furthermore, it reveals that the overall mean value on the level of the perception of teachers regarding the use of the PECS strategy for teaching communication skills to students with autism in terms of using visual supports is 4.29 ($SD=0.64$), which is described as "high".

Table 2. The Perception of Teachers Regarding the Use of the PECS Strategy for Teaching Communication Skills to Students with Autism in Terms of Use of Visual Supports

	Statements	SD	Mean	Descriptive Interpretation
1	Seeing that the use of pictures helps my students with autism express themselves more easily.	0.47	4.66	High
2	Making use of the visual representation of each object to help my students with autism remember the object and the word.	0.72	4.42	High
3	Using visual aids in teaching communication to students with autism to get their attention and focus.	0.92	4.00	High
4	Using visual materials to help facilitate better understanding and comprehension of students with autism.	0.83	4.06	High
5	I will apply the use of illustrations to my students to help enhance their communication skills.	0.76	4.32	High
	Overall Mean	0.64	4.29	High

This means that the respondents prefer to use pictures (PECS) as visual support to help autistic students express themselves more easily. The study also revealed that PECS as visual support is an effective system for teaching English vocabulary and simple conversational sentences or phrases in the early stages of language teaching. L. Kaduk (2017) the continued use of PECS on children with autism spectrum disorder showed huge improvements and increased communication skills after the implementation of PECS. Therefore, it can help develop expressive language among children with Autism as well.

3.2 Gradual Communication Development

The calculated standard deviation of 0.76, with an average of 3.94, suggests that utilizing pictures is effective in aiding the communication development of students with autism, gradually enhancing their ability to express themselves. Similarly, visual aids, indicated by a computed SD of 0.89 and an average of 3.96, also exhibit a high impact on communication development for these students. Additionally, the use of illustrations, with an SD of 0.84 and a mean of 4.08, further supports the advancement of communication skills in this group. Both drawings and visuals assist students with autism in articulating their needs and desires, highlighted by an SD of 0.74 and a mean of 4.24. Finally, statement 5, with a standard deviation of 0.69 and a mean of 4.14, indicates that employing visual representations aids students with autism in gradually associating objects with corresponding words.

Table 3. The Perception of Teachers Regarding the Use of the PECS Strategy for Teaching Communication Skills to Students with Autism in Terms of Gradual Communication Development

	Statements	SD	Mean	Descriptive Interpretation
1	Using pictures, my students with autism are learning to communicate little by little.	0.76	3.94	High
2	Using visual aids, the communication development of my students with autism improved.	0.89	3.96	High
3	Illustrations support the development of the communication skills of students with autism.	0.84	4.08	High
4	Using drawings and visuals helps my students with autism express their needs and wants.	0.74	4.24	High
5	Using visual representation helps my students with autism slowly identify objects incorporated with words.	0.69	4.14	High
	Overall Mean	0.73	4.07	High

As shown in Table 3, the computed overall mean is 4.07, with a standard deviation of 0.73 denoting that the use of the PECS Strategy for Teaching Communication Skills to Students with Autism is effective in Gradual Communication Development which is described as high. This finding is supported by the study of Magiati, et.al 2003, which showed that the children's level of PECS proficiency, PECS vocabulary, and frequency of PECS use all showed notable, quick increases over time. The general level of communication among children improved more slowly. Most participants demonstrated gains in their PECS proficiency.

Added to this are some strong assertions emphasized by Martin 2016 that functional communication skills in PECS would enable them to effectively express their most fundamental needs and desires. Depending on their developmental and functional levels, students differed in their level of mastery of these abilities.

3.3 Emphasis on Initiation and Social Interaction

Presented in Table 4 is The Perception of Teachers regarding the Use of the PECS Strategy for Teaching Communication Skills to Students with Autism in Terms of Emphasis on Initiation and Social Interaction. As seen in the table the statement "Using pictures in teaching communication, my students with autism are becoming more confident in starting conversations and interacting with others, which is helping them build better social connections" and "Using of visual aids by students with autism helps develop their interest in expressing themselves, like how they feel with other students" both obtain the highest mean value among the five (5)

statements. And the two statements has different standard deviation (x=4.06, SD=0.86) and (x=4.06, SD=0.83), among the two, only the latter is consistently perceived by teachers wherein PECS highly helped developed children with autism's initiation skills and social circle since it has a lower standard deviation. On the other hand, the statement "Having drawings of portraits in teaching communication effectively fosters a sense of initiative in students with autism to engage in answering WH questions" obtains the lowest mean (x=3.76, SD=1.01) which means that this teaching strategy is sometimes applied in teaching children with autism. It reveals further that the overall mean value in Table 4 is x=3.97 which means that PECS as perceived by teachers has a high descriptive interpretation in Terms of Emphasis on Initiation and Social Interaction.

Table 4. The Perception of Teachers Regarding the Use of the PECS Strategy for Teaching Communication Skills to Students with Autism in Terms of Emphasis on Initiation and Social Interaction

	Statements	SD	Mean	Descriptive Interpretation
1	Using pictures in teaching communication, my students with autism are becoming more confident in starting conversations and interacting with others, which is helping them build better social connections.	0.86	4.06	High
2	Using illustrations in teaching communication to students with autism fosters initiative to engage in social interactions like playing with other kids.	0.85	4.04	High
3	Having drawings of portraits in teaching communication effectively fosters a sense of initiative in students with autism to engage in answering WH questions.	1.01	3.76	High
4	Using of visual aids by students with autism helps develop their interest in expressing themselves, like how they feel with other students.	0.83	4.06	High
5	Using portraits, drawings, pictures, and illustrations helped students with autism participate actively in class, giving them the opportunity to socialize with their classmates in a classroom setting.	0.91	3.92	High
	Overall Mean	0.82	3.97	High

Thus, PECS as perceived by teachers helps children with autism in initiating communication and improves non-verbal kids to enhance their social circle this is made true by Andy Bondy, PhD, and Lori Frost, MS, CCC-SLP, 2001 (The Picture Exchange Communication System) the developer of PECS and the founders of the pyramid. In their study, PECS helps improve the communication skills of people on the autism spectrum and promotes their ability to initiate communication. Studies have shown PECS to aid in verbal development, which could improve verbal behavior. Michelle Flippin et al. Am J Speech Lang Pathol, 2010; in their book, the Effectiveness of (PECS) Picture Exchange Communication System on Communication and Speech for Children with Autism: A Meta-analysis. This implies that by being able to learn the language, children with autism also learn to express themselves which will help them connect with other people around them. They will learn that certain words are used to express their feelings and emotions. And that will give them confidence in any form of interaction with others around them.

3.4 The Perception of Teachers Regarding the use of the PECS Strategy for teaching communication skills

Presented in Table 5 is the perception of teachers regarding the use of the PECS strategy for teaching communication skills to students with autism in two (2) Schools in Davao City. It reveals that the indicator "use of visual supports" obtained the highest mean value among the three (3) indicators (X=4.29, SD=0.64), which is described as "high". On the contrary, the indicator "emphasis on initiation and social interaction" obtained the lowest mean among the three (3) indicators (X=3.97, SD=0.82), which was described as "high". Furthermore, it shows that the overall mean value on the level of the perception of teachers regarding the use of the PECS strategy for teaching communication skills to students with autism is 4.11 (SD=0.70), which is described as "high".

Table 5. The Perception of Teachers Regarding the Use of the PECS Strategy for Teaching Communication Skills to Students with Autism

Use of Visual Supports	0.64	4.29	High
Gradual Communication Development	0.73	4.07	High
Emphasis on Initiation and Social Interaction	0.82	3.97	High
Overall Mean	0.70	4.11	High

This means that the teachers prefer to use PECS as visual support in teaching children with special needs and or children with autism spectrum disorder (ASD). P. Dallas (2019) in his findings that PECS is evident and remains supreme regarding initiated conversation with both prompted and spontaneous communications by individuals. In addition, the use of visual support is to broaden the teaching strategy of the special education teachers like using PECS to improve and develop the communication skills of children with ASD or children with special needs. Using the Picture Exchange Communication System Strategy in teaching makes it easier for learners with autism to understand the lesson in a general manner, this is because children with autism are described as very incredible visual learners. And the best strategy to use is teaching with visual aids, it complements their visual learning style (Rao & Gagie, 2006; Tissot & Evans, 2003).

4.5 Communication Skills of Students with Autism as Perceived by Teachers

Presented in Table 6 is the level of teachers’ perception regarding the use of the PECS strategy for teaching communication skills to students with autism in 2 Schools in Davao City in terms of the Communication Skills of students with Autism. It reveals that the statement “I believe that the effects of visual support on communication skills are lasting and enduring.” Got the highest mean value among ten (ten) statements (X=4.4, SD=0.80) and is described as “High”. On the other hand the statement “I observed my students with autism becoming good at sharing their thoughts and needs.” Obtained the lowest mean value among the ten (10) statements (X=3.7, SD=0.78) which is described as “High”. In summary, it reveals the overall mean value of the teachers’ perception regarding the use of the PECS strategy for teaching communication skills to students 4.11 (SD=80) which is described as “Highly.” In addition, if we thoroughly examine the results the lowest SD is equal to 0.77 which the statements “Visual representation of materials help learners with autism understand and tell messages”, “Visual aids contribute significantly to the progress of communication for students with autism” and “Using cards with pictures, symbols, and words enhances the social interaction and involvement of learners with autism” got.

Table 6: Communication Skills of Students with Autism as Perceived by Teachers

	Statements	SD	Mean	Descriptive Interpretation
visual Aids such as Picture	1 The students with autism good at sharing their thoughts and needs.	0.78	3.70	High
	2 Through visual aids, students with autism were able to enhance their communication skills.	0.82	4.14	High
	3 Using pictures effectively supports the development of communication skills in students with autism.	0.89	4.04	High
	4 Illustrations enhance students’ ability to express their needs and wants.	0.87	4.08	High
	5 Visual representation of materials helps learners with autism understand and tell messages.	0.77	4.04	High
	6 Illustrations and pictures of real objects are tools for teaching communication to students with autism.	0.93	4.08	High
	7 Visual aids contribute significantly to the progress of communication for students with autism.	0.77	4.26	High
	8 Using cards with pictures, symbols, and words enhances the social interaction and involvement of learners with autism.	0.77	4.04	High
	9 The effects of visual support on communication skills are lasting and enduring.	0.80	4.44	High
	10 Through visuals, students with autism were able to gradually speak and communicate with their peers.	0.80	4.28	High
	Overall Mean	0.80	4.11	High

Exchange Communication System or PECS in Teaching Learners with Special Needs (IJRP) learners and children with special needs has become part of the learning process in teaching (Meredith, 1947). Incorporating images in education helps awaken the interest of the students' minds (Shabiralyani, 2015). Aside from being an effective tool for developing language and communication skills, using Visual representations in the classroom provides a deeper understanding for learners and this makes participation and encourages communication to the whole class Fish, Mun, and A'Jontue, (2016). Thus, students learn faster when using these Illustrations in teaching. Learning language and communication, it becomes a big milestone for these students, especially children with conditions like Autism Spectrum Disorder or ASD. And that is the most significant impact of learning language through the use of images or PECS in teaching. The statement "The effects of visual support on communication skills are lasting and enduring" implies. The (PECS) or Picture Exchange Communication System is a communication system specifically created to aid children diagnosed with Autism Spectrum Disorder and those experiencing significant language delays in developing communication and language skills (Carre, Grice, Walker, 2009).. And learning to express themselves and communicate will help these children excel in their chosen paths later in life. That we believe, is what visual support helped and imparted to these learners. This result also, revealed that the expression of thoughts and needs of learners with special needs may not be observed immediately like other typical learners do. When discussing language development in children with Autism in comparison to typically developing children, the outcomes vary significantly.

On the other hand the statements "Visual representation of materials help learners with autism understand and tell messages", "Visual aids contribute significantly to the progress of communication for students with autism" and "Using cards with pictures, symbols, and words enhances the social interaction and involvement of learners with autism" got the lowest DS=0.70, going back to the table the highest Mean (\bar{x} =4.44) did not got the lowest SD. This implies that teachers can see significant acquisition of language and that children with autism can interconnect those words to form a sentence which will help them communicate. From these more specific improvements these children will be able to slowly develop language and that is a huge milestone for their development.

4.6 Significant Effect of Teachers' Perception of PECS Strategy on the Communication Skills of Students with Autism

Presented in Table 7. is the regression analysis showing the influence of indicators of the predictor variable teacher's perception of PECS Strategy on the communication skills of students with autism.

The indicator use of visual supports is in the table of analysis. The standardized coefficient beta of -1.102 with a p-value of 0.000 significantly influences the communication skills of students with autism.

The gradual communication development with a beta of -0.614 and a p-value of 0.035 is a significant indicator to influence the dependent variable. The third indicator, the emphasis on initiation and social interaction with a beta of 2.523 and the p-value of 0.000, is an important indicator that influences the dependent variable communication skills of students with autism.

The t-value of 6.698 for the indicator emphasis on initiation and social interaction has the highest value, and the Use of Visual Supports with a t-value of -4.916 is the lowest. That means that there is more significant evidence *against* the null hypothesis because the more extensive the absolute value of the t-value, the smaller the p-value, and the greater the evidence against the null hypothesis.

The R² value of 0.837 or 83.7% of the variance, explained by the teacher's perception of the PECS Strategy, contributed significantly to the communication skills of students with autism. Furthermore, as reflected by the F-value of 78.484 with the corresponding p-value of 0.000, the regression analysis is significant. On the other hand, to understand the significant influence of the indicators of teachers' perception of the PECS Strategy on the communication skills of students with autism, the researcher illustrated it mathematically based on the presented Table 7. To translate Table 7 mathematically, a prediction model is presented. Although it is not indicated in the statement of the problem, the researcher extended the discussion on the influence of teachers' perception of the PECS Strategy on the communication skills of students with autism for the reason that some readers can easily understand the setting if it is presented through a mathematical model.

Prediction Model

$$Y = a + bc_1 + bc_2 + .. + bc_n + e$$

$$CSSA = 1.680 - 1.100 (UVS) - 0.537 (GCD) + 2.272 (EISI)$$

where:

- CSSA = communication skills of students with autism
- a = constant
- b = coefficient
- c = independent variables
- e = random error term
- UVS = Use of Visual Supports
- GCD = Gradual Communication Development
- EISI = Emphasis on Initiation and Social Interaction

Statistical Interpretation:

$b_1 = -1.00$: Holding all other parameters constant, every 1-point improvement in use of visual supports leads to a 1.100-point decrease in communication skills of students with autism

$b_2 = -0.537$: For every 1-point increase in the Gradual Communication Development there is a decrease in the communication skills of students with autism of 0.537 points holding other factors constant.

$b_3 = 2.272$: For every 1-point increase in the Emphasis on Initiation and Social Interaction there is an increase in the communication skills of students with autism of 2.272 points holding other factors constant.

Table 7. Significant Effect of Teachers’ Perception of PECS Strategy on the Communication Skills of Students with Autism

	Communication Skills of Students with Autism as Perceived by Teachers						
	Unstandardized Coefficients		Standardized Coefficients				Decision on Ho
The Teachers’ Perception of PECS Strategy	B	Std. Error	Beta	t	Sig.		
Constant	1.680	0.275		6.111	0.000	Reject Ho	Significant
Use of Visual Supports	-1.100	0.224	-1.102	-4.916	0.000	Reject Ho	Significant
Gradual Communication Development	-0.537	0.247	-0.614	-2.176	0.035	Reject Ho	Significant
Emphasis on Initiation and Social Interaction	2.272	0.339	2.523	6.698	0.000	Reject Ho	Significant
R = 0.915;		R² = 0.837;		F-value = 78.484; p-value = 0.000			

4. Conclusion

This quantitative research provides compelling evidence regarding the significant effect of teachers' perception of the Picture Exchange Communication System (PECS) strategy on the communication skills of students with autism. The analysis reveals meaningful insights into the relationship between teachers' perceptions of

The use of visual supports emerges as a crucial factor influencing communication skills. It indicates that a more favorable perception of visual support within the PECS strategy is associated with a decline in communication skills among students with autism; the gradual communication development also demonstrates a significant impact. It suggests that teachers who perceive an incremental approach within the PECS strategy correlate with lower communication skills in autistic students.

On the other hand, a positive and significant relationship is observed in the emphasis on initiation and social interaction. It indicates that teachers who value and emphasize initiation and social interaction within the PECS strategy are associated with higher communication skills in autism students.

It shows that the connection between teachers' views of the PECS strategy and students with autism's communication skills is solid and reliable. Rejecting the null hypothesis for each predictor variable strengthens the importance of these relationships.

It suggests the importance of tailored professional development for educators, focusing on enhancing their understanding and implementation of specific components within the PECS strategy. The emphasis on visual supports, gradual communication development, and initiation with social interaction emerges as critical areas for targeted interventions to optimize the communication outcomes for students with autism.

In conclusion, this study contributes high value insights into the refinement of the impact of teachers' perceptions of the PECS strategy on the communication skills of students with autism, providing a foundation for informed pedagogical practices and further research in special education.

5. Recommendation

Based on the findings of this research, the following were recommended for further consideration for future studies:

- It is recommended to Conduct training for teachers on how to effectively use PECS to gradually improve the communication skills of children with ASD. Organize more training that teachers can attend to make them ready and equipped with full knowledge about PECS. This will maximize the full potential of PECS as a very effective strategy in teaching children with communication Skills. Teachers will also gain confidence in using this strategy. The Department of Education should lead and initiate organizing the training for the teachers. School-based programs/training will encourage teachers to prioritize and integrate initiation and social interaction strategies in their instructional practices, which will positively impact the communication development of students with autism. Workshops or training modules can provide practical guidance on incorporating these elements into daily teaching routines.
- It is also recommended that the Department of Education organize or conduct training focusing on the low mean indicators in this study. These are the following; *Gradual Communication Development and Emphasis on Initiation and Social Interaction*. The school or the teacher can organize lessons that will focus on the encouragement of using communication, as well as activities that will encourage socialization for children with disabilities. There are many school programs that these learners can take part in if only they are allowed to join. These activities will expose the children to real-life situations that will encourage them to express themselves as well as socialize with others.
- It is also recommended and important to collaborate with parents to maintain the consistency and the momentum of PECS usage across the places not only in school but in any places the children with ASD frequently visit. Parents are encouraged to learn this strategy so there is consistency in learning by the child with autism. Teachers can organize a parent orientation to inform the parents about the implementation of PECS, teachers can do this by demonstrating to the parents the basics of using PECS and giving them ideas on how to integrate daily.
- It is also recommended to extend the use of visual support as part of the PECS strategy, to functionally develop the lacking of skills when communicating effectively. PECS allows children to positively learn, especially when

we use colorful visual aids and pictures. This is also suggested by the statement of the class on decorations at least in the Sped classrooms since the DepEd Secretary of the Philippines Sara Duterte implemented Department Order 21 which states that schools “shall ensure that school grounds, classrooms and all its walls, and other school facilities are clean and free from unnecessary artwork, decorations, tarpaulin, and posters at all times” because it believes that it creates distractions to learners inside the classroom. However, for children with autism spectrum disorder (ASD) or even children with special needs, this is not a distraction but rather a helpful method or strategy to entertain the uniqueness of every individual inside the classroom. Since our country the Philippines adopted the Transition Program of other countries and our Model is mainstreaming if it is possible to amend the DepEd Order 21 to cater to individual differences perhaps admissible. The children’s progress when using PECS as a strategy in communication is visible. Having this way of learning or associating this kind of strategy in their daily living routine will encourage them to communicate with you more often and exercise their vocabulary through pictures or images which leads the children with difficulties communicating with confidence.

- It is also recommended to conduct individualized assessments to the students with autism in terms of their development in learning to communicate. Teachers can conduct regular progress monitoring, through assessment. This way teachers can identify their focus/target to develop on the child. This can be part of their IEP.
- Facilitate collaboration and Information Sharing. Strengthening collaboration among general Education Teachers, Special Education teachers, and Clinical service providers like Developmental pediatricians and Therapists to work together in the implementation and Development of PECS. Encourage information sharing, experiences, and best practices to improve communication outcomes for learners with Autism. Also, this can help as a basis in organizing teacher training, this will serve as a solid foundation for implementation of PECS.
- Future Researchers may use this study as a reference to further investigate the Teachers’ Perceptions of the Picture Exchange Communication System (PECS) Strategy and the Effects on the Achievement of Students with Autism in Learning Communication Skills. More effects can be explored as a result of using the PECS strategy in teaching.
- In Davao City, it is recommended that SPED (Special Education) teachers utilize the Picture Exchange Communication System (PECS) while ensuring thorough process checks are consistently carried out. SPED teachers need to document students' grammatical deficiencies in their constructions. They should then reinforce learning by creating additional activities that specifically target and address these identified areas of need.

Acknowledgment

The authors express their gratitude to the 50 Public School teachers from the 2 Schools here in Davao City. The participants' readiness to respond to the survey questionnaire significantly contributed to the success of this study. We would also like to extend our thanks to the Schools Division Superintendent, Assistant Schools Division Superintendent, and Principals of the two (2) Schools in Davao City for their consistent and invaluable support throughout the research process. In addition, the researchers also extend their appreciation to all relatives and friends who provided moral, financial, and physical support. Above all, the researchers are deeply thankful to God, the source of knowledge and wisdom, for His boundless love.

References

- Almalki, S. G. (2021). Special education teachers’ perceptions of using Picture Exchange Communication System in teaching children with autism in Saudi Arabia. (Doctoral dissertation, Saint Louis University).
- Andy Bondy, PhD, and Lori Frost, MS, CCC-SLP(2001). The Picture Exchange Communication System
- Baker, L., & Cantwell, D. P. (1987). A prospective psychiatric follow-up of children with speech/language disorders. *Journal of the American Academy of Child and Adolescent Psychiatry*, **26**, 546–553.
- Barrera, G. (2023). The Effects of a Picture Exchange
- Black, Donald W. The DSM-5, released in 2013, definition of Autism Spectrum Disorder DSM-5 revision tweaks autism entry for clarity” The Diagnostic Statistical Manual of Mental Disorders. Fifth Edition 2022.
- Charlop-Christy, et.al 2013 in their paper “Using the (PECS) with Children with Autism: Assessment of PECS Acquisition, Speech, Social- Communicative Behavior, and Problem Behavior Communication System

- Charman T, Drew A, Baird C, Baird G. Measuring early language development in preschool children with autism spectrum disorder using the MacArthur Communicative Development Inventory (infant form). *Journal of Child Language* 2003b;30:213–236. [PubMed: 12718299]
- Creswell, J. W., & Plano Clark, V. L. (2017). *Designing and conducting mixed methods research* (3rd ed.). SAGE Publications.
- Doherty, A., Bracken, M., & Gormley, L. (2018). Teaching children with autism to initiate and respond to peer minds using a picture exchange communication system (PECS). Effectiveness of the picture exchange communication system in teaching English vocabulary in children with autism spectrum disorders: A single-subject study.
- Hasan, A. A. (2020). Assessment of family knowledge toward their children with autism spectrum disorder at Al-Hilla City, Iraq. *Indian Journal of Forensic Medicine & Toxicology*, 14(3), 1801.
- Hughes-Lika, J., & Chiesa, M. (2021). The Picture Exchange Communication System and adults lacking functional communication: A research review. *The picture exchange communication system and adults lacking functional communication: A research review. European Journal of Behavior Analysis*, 22(1), 40-58.
- Lu J, Xiao M, Guo X, Liang Y, Wang M, Xu J, Liu L, Wang Z, Zeng G, Liu K, Li L, Yao P. Maternal diabetes induces immune dysfunction in autistic offspring through oxidative stress in hematopoietic stem cells. *Front Psychiatry*. 2020;11:576367.
- Luigi, 2012 as cited by Craig, 2017, *Social Communication in Children with Autism Spectrum Disorder (ASD)*- <https://onlinelibrary.wiley.com/authoried-by/Russo/Luigi>
- Mohammed F Safi et al. BMC Psychol. 2022.) Parenting children with autism spectrum disorder in the United Arab Emirates: Exploring perceptions towards using the picture exchange communication system to enhance the development of children with autism spectrum disorder
- Raiyn, J. (2016). The role of visual learning in improving students' high-order thinking skills. *Journal of Education and Practice*, 7(24), 115.
- Shabiralyani, G., Hasan, K. S., Hamad, N., & Iqbal, N. (2015). Impact of visual aids in enhancing the learning process case research: District Dera Ghazi Kan. *Journal of Education and Practice*, 6(19), 226-227.
- Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. New York: Appleton Century.
- Taryadi, T., Kurniawan, I., & Binabar, S. W. (2019). Improved communication skills of children with Autism Spectrum Disorder using Augmented Reality based on PECS (Picture Exchange Communication System). *Journal of Telematics and Informatics*, 7(4), 185-197.
- Tomasello, M., 2016 "Origins of Human Communication". *MIT Press*. Retrieved 2016-02-09)
- Watson, J. B. (1913). Psychology as the behaviorist views it. *Psychological Review*, 20, 158–177.
- Weismer, S. E., Lord, C., and Esler, A. (2010). Early Language Patterns of Toddlers on the Autism Spectrum Compared to Toddlers with Developmental Delay. *J. Autism Dev. Disord.* 40, 1259–1273. doi: 10.1007/s10803-010-0983
- Zohoorian, Z., Zeraatpish, M., & Matin sadr, N. (2021). Improved communication skills of children with autism spectrum disorder using Augmented Reality based on PECS (Picture Exchange Communication System) Effectiveness of the picture exchange communication system in teaching English vocabulary in children with autism spectrum disorders: A single-subject study. *Cogent Education*, 8(1), 1892995. Initiate and respond to peer minds using a picture exchange communication system (PECS). *Behavior analysis in practice*, 11(4), 279-288.