



Status of Picture Icon Communication Strategy in Enhancing Expressive Language Skills among Learners with Autism Spectrum Disorder in Inclusive Primary Schools

Evernate Adhiambo Oronge
Department of Educational Psychology and Science
Rongo University
Email: evernateoronge@gmail.com

Abstract: Learners with Autism Spectrum Disorder (ASD) in mainstream primary schools find it difficult to develop skills in expressing language, which hinders their effective communication. There is little evidence regarding enhanced skills in expressive language using Picture Exchange Communication System (PECS) and its various components. This study aimed to assess Picture Icon Communication Strategy and expressive language ability of ASD children in selected public primary schools in Migori County, Kenya. The study was grounded on Mill's Social Influence Theory (1790) and employed a descriptive survey. The study population comprised of 120 teachers, 40 headteachers, 107 parents, 8 Educational Assessment Resource Center officers, and 120 learners with ASD. Sample selection was both purposive and simple random. Data collection was through the use of questionnaires, interview guides, and observation checklists, which were then analyzed through both descriptive and inferential statistics using SPSS version 26, while qualitative data were thematically analyzed. Reliability was determined using Cronbach's alpha (0.750). The study established that use of picture icon strategies offer opportunities to learners with ASD to express their language skills, thus the study concludes that Picture Icon Communication Strategy has positive effects on the expressive language of learners with ASD, and suggests that picture icons be used more often to improve communication skills in all our mainstream classrooms.

Keywords: Autism, Disorder, Inclusive, Spectrum, Impairment

How to cite this work (APA):

Oronge, E. A. (2026). Status of Picture Icon Communication Strategy in Enhancing Expressive Language Skills among Learners with Autism Spectrum Disorder in Inclusive Primary Schools. *Journal of Research Innovation and Implications in Education*, 10(2), 1055 – 1063. <https://doi.org/10.59765/1st9f>

1. Introduction

Autism Spectrum Disorder (ASD) is a neurodevelopmental disorder defined by a marked lack of social interaction and communication skills, as well as a narrowing and repetition

of behaviors, which first appear in early childhood. One of the most serious and long-term issues, the ASD learner, faces is the impairment of Expressive Language Skills (ELS). ELS is the ability to convey thoughts, emotions, and intentions, as well as the ability to express needs, with

verbal or non-verbal means. This impairment of Expressive Language severely limits the ability to functionally communicate, engage in learning activities, and socialize. The communication deficits remain one of the main characteristics of ASD and require the application of structured and evidence-based practices to enable the learner to actively participate in an inclusive classroom. The picture icon communication strategy, which is an approach to the use of pictures, is cited in the literature as one of the methods used to teach people with ASD to express themselves (Alvarez & Wolfe, 2023; Griffen et al., 2024).

Within an inclusive educational model, learners with ASD are placed alongside typically developing learners, and both groups are expected to take part in the same learning activities; however, limitations of Expressive Language pose barriers to the participation of learners with ASD within the classroom. These learners face difficulties with the self-initiation of communication, the compliance of verbal instructions, and the contextual use of vocabulary to make meaningful sentences. These issues often result in decreased participation within the academic environment, along with social and communicative interactions with peers. It is evident from a review of the current body of literature that the lack of communication support has a significant, negative impact on the educational and social outcomes of learners with ASD (Griffen et al., 2024; Wandin et al., 2023).

To help these learners overcome barriers to communication, special educators have implemented the use of augmentative and alternative communication systems (AAC). Among those systems, the picture icon communication system stands out. This system uses simple symbols, or picture icons, for various objects or ideas, which learners can select and use to create a message. Learners with autism spectrum disorder (ASD) can use the picture icon system to express messages when speech does not come easily to them. Picture icons are a part of visual based AAC systems. Picture icons, and other visual based AAC systems, have been shown to improve communication, focus, and the development of expressive language in learners with ASD (Logan et al., 2024).

The picture icon communication strategy consists of structured visuals that allow learners to communicate needs and wants. The use of picture icons as verbal cues creates less of a demand on cognitive language processing, as picture icons are very clear and address a specific need. When learners are shown a specific icon multiple times, they will begin to associate that icon with the message, especially when teachers use the icon during classroom activities. The picture icons serve as a support system to help learners construct a message when they know what they want to say, but cannot.

In this context, the study investigated the extent to which the Picture Icon Communication Strategy is used in Migori County, Kenya, to enhance the expressive language skills of children with autism spectrum disorder. The study examined the use of picture icons to facilitate development of expressive language in inclusive classrooms.

This study was informed by Social influence Theory. This theory suggests that people's behavior can be manipulated or molded by environmental stimuli. Social contexts and behavior cues can be used to facilitate change. Structured picture icons used in this study act as stimuli that channel communication behavior for learners with ASD. With the proper repetition and reinforcement, individuals will be able to interpret the picture with the desired meaning and expand their verbal expression. This is in concurrence with the idea that visual communication systems can leverage the layout of an environment to organize and facilitate the development of language for individuals, while providing behavioral stimuli (Alvarez & Wolfe, 2023; Logan et al., 2024).

Using the existing body of research and theoretical frameworks to support communication interventions via visual aids communication, there is still an empirical gap to fully understand the role of picture communication strategies and their impact on facilitating the expressive language skills for learners with ASD in the mainstream primary schools in Kenya. Thus, the current study provides insight on the use and effectiveness of the picture communication system model in the Migori County context, while providing evidence for inclusive teaching, communication training for teachers, and specialized communication interventions for learners with ASD.

2. Literature Review

Communication challenges are among the defining characteristics of autism spectrum disorder (ASD), with many learners experiencing difficulties in expressing their thoughts, feelings, and needs effectively. Such limitations in expressive language often hinder social interactions, academic engagement, and participation in everyday activities. According to recent literature, learners with ASD capitalize on their strong visual learning abilities. Accordingly, picture-based communication proves to be very useful. Several studies have explored the use of visual communication and have shown that the presence of organized and structured visual stimuli led to increased levels of comprehension, increased levels of attention and increased levels of expressive participation in classroom activities (Liang et al., 2024; Wandin et al., 2023). Evidence also suggests that picture communication systems target expressive language and lead to close and successful outcomes when continuously implemented in

natural learning settings (White et al., 2023). The use of picture icon strategies in communication also depends on the competencies of the teachers, the presence of teaching materials, and the habitual use of picture icon strategies in integrated classroom settings.

Researchers and practitioners have increasingly focused on identifying interventions that can enhance communication and language development among learners with ASD. In this regard, visual-based Augmentative and Alternative Communication (AAC) approaches have gained considerable recognition because they capitalize on the visual strengths commonly exhibited by individuals with autism. Among these approaches, the Picture Exchange Communication System (PECS), which employs picture icons to facilitate communication, has emerged as one of the most widely adopted interventions.

Global research recognizes the value of visual communication strategies, but findings are inconsistent on the efficacy of picture icons in developing expressive language in inclusive primary school contexts. Systematic reviews assess that while visual AAC methods have a positive impact, research has a poor grasp on how specific picture strategies influence the development of expressive language of learners with ASD (Bordini et al., 2024). White et al. (2024) reported that modifications to PECS increased independent vocalizations among preschool children with autism, indicating that picture-based interventions can support speech development and expressive communication. Similarly, Sukriananda and Mangunsong (2023) found that non-verbal children with ASD demonstrated improved communication initiation after using PECS, suggesting that visual symbols offer learners alternative ways of expressing their needs and intentions.

Beyond facilitating communication initiation, picture icon strategies have also been associated with improvements in vocabulary development and sentence formation. In Saudi Arabia, Alfuraih et al. (2024) found that children with autism and multiple disabilities acquired more vocabulary and produced longer utterances following PECS intervention. The study further revealed that these gains were maintained and transferred across different settings, demonstrating the potential of picture-based communication to support sustained expressive language development. In a related study, Liang et al. (2024) established that structured visual supports enhanced comprehension, participation, and language performance among children with ASD. These findings underscore the important role that visual learning strategies play in promoting communication and language acquisition among learners with autism.

Advances in technology have further broadened the application of picture icon communication strategies. Liu et al. (2023) developed PECS Online, a digital picture exchange communication system intended for use in classroom settings. Teachers who participated in the study perceived the system positively and considered it a practical tool for supporting communication among learners with autism in inclusive classrooms. This demonstrates that picture icon communication strategies can be adapted to modern educational environments and used to enhance learner participation and interaction.

Despite the promising outcomes reported in previous studies, evidence regarding the contribution of picture icon communication strategies to expressive language development remains mixed. Much of the existing research has focused on communication initiation, requesting behaviour, vocabulary acquisition, and speech production, with relatively less attention devoted to expressive language skills as a comprehensive construct. Moreover, many of the studies have been conducted in clinical settings or have employed experimental designs involving small samples, thereby limiting the applicability of their findings to inclusive primary school settings (White et al., 2024; Alfuraih et al., 2024).

In sub-Saharan Africa and Kenya, research on picture icon communication strategies is scarce. Most studies brush on elements of communication or on the behavioral outcomes, with little emphasis on research on expressive language development. In Migori County, learners with ASD studying in regular primary schools face significant communication challenges due to the absence of structured visual communication resources, poor teacher readiness and the sporadic use of picture strategies. These challenges show the need to have context-specific research on the use of picture icon communication strategies.

Much of the available evidence originates from developed countries whose educational contexts differ considerably from those in Kenya. This limits the generalizability of existing findings to local settings. Specifically, there is scant empirical evidence on the status of Picture Icon Communication Strategy and its contribution to enhancing expressive language skills among learners with ASD in inclusive primary schools in Migori County, Kenya. Studies conducted in Kenya have largely concentrated on issues such as teacher preparedness, inclusive practices, and barriers to learning among learners with ASD. Consequently, there is limited evidence on the availability and use of picture icon communication strategies and how they contribute to the development of expressive language skills among learners with ASD in inclusive primary schools. The present study therefore, sought to address this contextual and empirical gap by examining the status of

Picture Icon Communication Strategy and its role in enhancing expressive language skills among learners with ASD in inclusive primary schools in Migori County, Kenya.

3. Methodology

3.1 Research Design

Utilizing both quantitative and qualitative approaches, the study employed a descriptive survey research design. This design was suitable, as it allowed the researcher to collect extensive information regarding the status and use of visual-based communication strategies, such as the use of picture icons in actual school settings, without manipulating any variables. Mixed-method approaches are generally the most suggested in ASD communication research, as they facilitate triangulation of behavioral and contextual data and, thus, improve both the validity and the overall depth of interpretation (Forbes et al., 2024). This design was suitable for assessing the role of visual communication strategies in relation to the development of expressive language skills of learners with ASD.

3.2 Study Area

The research took place in several primary schools in Migori County, Kenya. This County was selected due to the wide integration of learners with autism spectrum disorder into mainstream education and their continuing problems with communication, especially in the area of expressive speech. Research shows that use of visual communication systems, especially picture-based

strategies, is especially inconsistent in resource-poor contexts. Therefore, Migori County proves to be the ideal context when examining the application of picture icon communication strategies within the practice of inclusive education.

3.3 Target Population

The target population involved stakeholders engaged in supporting learners with ASD in inclusive primary schools. These were head teachers from selected primary schools, teachers of learners with ASD, learners with ASD in inclusive classrooms, the parents/guardians of learners with ASD, and EARC officers. These groups were needed for the study, as the successful application of PECS-based interventions highly depends on the collaboration of teachers, parents, and other professionals (Paris et al, 2024). The target population comprised 395 respondents from 40 regular primary schools in Migori County.

3.4 Sampling Techniques and Sample Size

The study used a blend of purposive sampling and simple random sampling. Teachers, EARC officers, and special schools were selected using purposive sampling since they are knowledgeable and directly involved in special needs education. A sample of teachers, learners with ASD, and parents/guardians was selected using simple random sampling to minimize bias and facilitate representation. Sample size was determined using 30% of the target population, which is the standard proportion for exploratory educational studies (Orodho, 2017). This derived a total sample of 124 respondents as shown.

Table 1: Sample size distribution

Respondent Group	Target Population (N)	Sample Size (n)
EARC Officers	8	8
Head Teachers	40	12
Teachers	120	36
Learners with ASD	120	36
Parents/Guardians	107	32
Total	395	124

3.5 Research Instruments

Data were gathered through questionnaires, interview schedules, and observation checklists. Quantitative data regarding teacher and head teacher use of picture icon communication strategies to facilitate learners' expressive language skills were captured using teacher and head teacher questionnaires. Parents and EARC officer

interviews were scheduled to obtain qualitative data regarding the communication development of learners and the picture icon use at home. Observation checklists were used to study the ability of learners with ASD in classroom surroundings to engage in the use of symbols to communicate. This study agrees with research that indicates that pictorial communication systems can be of great help to learners with ASD as they promote functional

communication (Sukriananda, Mangunsong, 2023; Alfuraih et al., 2024).

3.6 Piloting Study

A study was conducted in a typical primary school in Rongo Sub-County, Migori County that has similar characteristics to the study area. The purpose of this study was to test the clarity, relevance and the level of the required information the study instruments were able to achieve. Piloting is very important to communication studies on ASD to ascertain that the instruments will be able to measure accurately the behavioral response to the expressive language skills (Forbes et al., 2024). The data collected from the pilot school were not included in the main study to ensure that there was no contamination.

3.7 Validity and Reliability of Instruments

The research instruments went through content and construct validation to ensure they were valid. In this case, special needs and educational psychology experts reviewed the instruments to see if they were focused on the study objectives. Construct validity was further strengthened by the presence of multiple instruments: questionnaires, interviews, and observation. Reliability was assessed through piloted instruments with Cronbach's Alpha coefficient. Results showed a value of 0.834, indicating a strong internal consistency of the instrument. Paris et al. (2024) recommends using the same methods to measure the accuracy and reliability of behavioral instruments in PECS implementation research.

3.8 Data Collection Procedures

Data collection was conducted after obtaining approval from the National Commission for Science, Technology and Innovation (NACOSTI) and permission from county education authorities and headteachers of selected schools. The researcher introduced the study and arranged suitable schedules. Questionnaires were administered to teachers and headteachers, while structured interviews were conducted with parents and Educational Assessment and Resource Centre (EARC) officers. Classroom observations captured learners' use of picture icons in real learning contexts, as supported in AAC research emphasizing

observation for expressive language assessment (Alfuraih et al., 2024). Ethical standards were strictly observed throughout.

3.9 Data Analysis

Both descriptive and inferential statistics were used to analyze the data. Quantitative data was analyzed in terms of frequencies, percentages, means, and standard deviations. Multiple linear regression analysis was conducted to establish the impact of picture icon communication strategy on learners' expressive language skills. The model utilized was:

$$Y = \beta_0 + \beta_1 X + \varepsilon$$

Where:

- Y = Expressive Language Skills (ELS)
- X = Picture Icon Communication Strategy
- ε = error term

Recent PECS studies utilize regression along with structured statistical modeling concerning the variability of communication among ASD learners (Koudys et al., 2023; Forbes et al., 2024). Qualitative data were subjected to thematic analysis.

3.10 Ethical Considerations

Ethical approval for the study was obtained from the National Commission for Science, Technology and Innovation (NACOSTI). Permission to conduct the research was also sought from the Migori County Director of Education and the headteachers of the selected schools. Before participation, informed consent was obtained from all adult respondents, including teachers, parents, headteachers, and Educational Assessment and Resource Centre (EARC) officers, while parental consent was secured for learners with autism spectrum disorder (ASD), with assent considered where appropriate. Participation in the study was entirely voluntary, and respondents were free to withdraw at any time without any consequences. Confidentiality and anonymity were strictly maintained by using codes instead of names, and all data were securely stored. The study also ensured minimal risk to learners with ASD by using non-intrusive data collection methods and adhered to the ethical principles of respect, beneficence, and justice throughout.

4. Results and Discussion

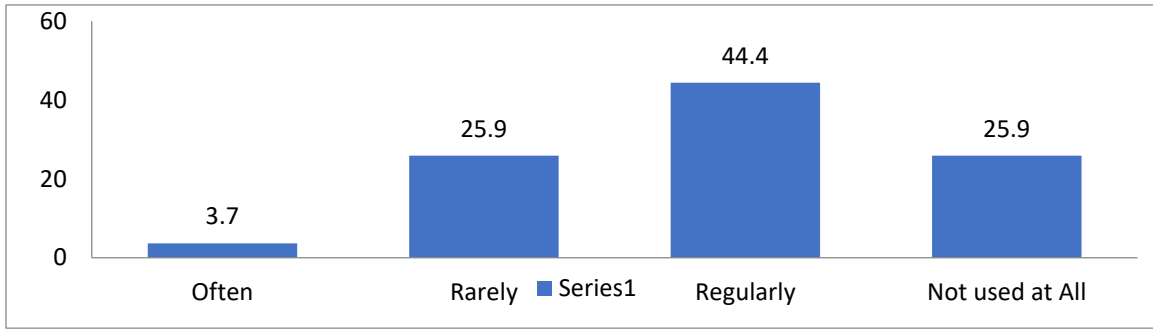


Figure 1: Availability and Use of Picture Icon Communication Strategy

The research focused on the status of picture icon communication strategy for developing expressive language skills (ELS) of learners with autism spectrum disorder (ASD) in inclusive primary schools. The findings showed that 15 (57.7%) of the teachers indicated that pictorial icon strategies are available at their schools, which shows the moderate availability of the visual communication resources in inclusive learning settings. However, the availability of pictorial icon strategies in classrooms was highly uneven. The results indicated that 12 (44.4%) of the teachers used pictorial icon strategies regularly, 7 (25.9%) used them rarely, 1 (3.7%) used them frequently, while 7 (25.9%) of the teachers did not use them at all.

The findings show the gap between the availability of pictorial icon communication strategies and their utilization in the classroom. This shows that the availability of resources is not enough for the integration of teaching. Studies that have common interest shows that the successful implementation of AAC depends largely on the training of the teachers and the provision of teaching support and hands-on implementation (Alfuraih et al., 2024; Paris et al., 2024).

The teachers were asked to use a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree) to indicate their level of agreement with statements related to the usefulness of pictorial icons in developing expressive language skills. The outcomes are presented in Table 2.

Table 2: Effectiveness of Picture Icon Strategy on Expressive Language Skills

Statement	1	2	3	4	5	Mean	SD
Picture icons help learners with ASD process language	-	1 (2.8%)	3 (8.3%)	17 (47.2%)	15 (41.7%)	4.29	0.74
Picture icons help learners understand new words	-	-	4 (11.1%)	16 (44.4%)	16 (44.4%)	4.33	0.68
Picture icons help learners express themselves in different ways	-	-	2 (5.6%)	28 (77.8%)	6 (16.7%)	4.11	0.47
Picture icons help learners use new words for different purposes	3 (8.6%)	3 (8.6%)	4 (11.4%)	19 (54.3%)	6 (17.1%)	3.63	1.14
I appreciate the use of picture icons in enhancing ELS	1 (2.8%)	-	-	23 (63.9%)	12 (33.3%)	4.25	0.73
Picture icons help learners use new vocabulary in communication	1 (2.8%)	-	2 (5.6%)	24 (66.7%)	9 (25.0%)	4.11	0.75
Overall Mean	2.0%	1.6%	7.6%	60.0%	31.8%	4.15	0.74

The data shows ($M = 4.15$, $SD = 0.74$) that the faculty agrees that pictorial icons develop the expressive language skills of ASD learners, and therefore, they are of great value. The data shows even more clearly that pictorial icons of language processing ($M = 4.29$) and vocabulary acquisition ($M = 4.33$) are positively of greater value and

influence descriptive language processing skills of ASD learners. The faculty shows less agreement toward pictorial icons' value of spontaneous communication ($M = 3.63$, $SD = 1.14$). This means that pictorial icons' value of higher order communication skills (requesting, commenting, etc.) is even less than spontaneous communication.

The results of the survey cohere with the recent research findings that visual AAC systems are very useful in language learning systems that teach structured learning; however, they are of very limited value in teaching spontaneous communication skills (Forbes et al., 2024; Koudys et al., 2023).

Home and Environmental Use of Picture Icons

Parents and guardians indicated at all three settings that 87.5% of learners used pictorial icons. The same proportion said learners were more engaged and interactive when pictorial icons were used at home. They said that pictorial communication can be pictures, emojis, cartoons,

photos, real objects, TV images, and gestures. This shows pictorial communication can be outside of just a classroom, and can be within natural settings. The results strongly indicate that pictorial communication can be used in most settings with the right kinds of reinforcement. Paris et al. (2024) indicated AAC becomes even more effective when the communicative behavior is shown consistently across various settings. This means that parents play an important part in keeping the communication and natural language skills going. A correlation analysis was conducted to see the relationship between using pictorial icons and communication skills.

Table 3: Correlation between Picture Icon Use and Expressive Language Skills

Variable	Picture Icon Use	Expressive Language Skills
Pearson Correlation	1.000	0.207
Sig. (2-tailed)	-	0.311
N	32	32

The results identified a weak positive relationship ($r = 0.207$, $p = 0.311$). At the 0.05 level, the result is not statistically significant. Therefore, we can say statistically that since pictorial icons were used more, expressive language skills increased. However, it is a weak relationship, therefore the result holds no significance.

This means that pictorial icons likely cannot improve expressive language skills much at all, unless there is a structured system, teacher training, and particular instructional methods. Similarly, in AAC research, they found that pictorial icons within a system hold some promise, however so do many other things, but the main focus needs to be on how the system is delivered/training/certification/implementation methods, etc. (Forbes et al., 2024; Koudys et al., 2023).

The findings show that pictorial communication systems are available and implemented in some greater inclusive primary school settings but seldom used. Most teachers think they improve expressive language skills in areas such as vocabulary and listening; however, they think they do not promote meaningful talking. The findings show a weak relationship that is not significant, pictorial icons and expressive language skills, and tends to show teacher training, the picture system, and usage are more important than availability. The findings say that the pictorial communication systems do help the expressive language skills of some learners with ASD saying that through structured communication the systems help the communication skills, but pictorial systems and poor teacher training show the systems help the communication skills, but poor teacher training and pictorial systems show the systems help the communication skills.

5. Conclusion and Recommendations

5.1 Conclusion

The study shows that the picture icon communication strategy is critical for developing the expressive language skills of ASD learners in primary school inclusion classes. Most schools have picture icons, but use is inconsistent, largely reliant on individual teachers, and not structured. Teachers feel the strategy positively impacts the development of foundational expressive language skills such as vocabulary, language and comprehension skills. The strategy largely lacks effectiveness for skills that support spontaneous communication such as initiating speech, making requests, and providing comments. Findings also show that there is a weak and non-significant relationship between the use of picture icons and the development of spontaneous communication skills. This also indicates that the use of picture icons in teaching is very reliant on the quality of implementation, preparation of the teachers, and consistency of use. The availability of teaching aids is of little value in the absence of these factors.

5.2 Recommendations

The Ministry of Education and school administrators should promote continuous teacher training for the proper use of picture icon communication with ASD learners. This training should provide teachers with formal training that has a strong classroom application component for the structured and spontaneous development of expressive

communication. This training should provide teachers with the tools to develop school-based communication frameworks along with spontaneous communication structures. Schools should purchase sufficient picture communication and classroom resources to teach communication and learning effectively.

Parents and guardians should use picture icon communication to encourage consistency and expressive communication skills. Curriculum developers should incorporate structured picture icon communication systems or other augmentative and alternative communication systems into the special needs education curriculum to strengthen the early communication and support element of the curriculum. More studies are needed to assess the impact of picture icon communication on the spontaneous development of expressive communication for learners with ASD. These studies should look into the role of teacher training, implementation fidelity, and the characteristics of the learners.

References

- Ahmed, S. K. (2024). How to choose a sampling technique and determine sample size for research: A simplified guide for researchers. *Oral Oncology Reports*, *12*, Article 100662. <https://doi.org/10.1016/j.oor.2024.100662>
- Alfuraih, R. K., Almalki, N. S., & AlNemary, F. M. (2024). Effectiveness of Picture Exchange Communication System in developing requesting skills for children with multiple disabilities. *Frontiers in Psychology*, *15*, Article 1434478. <https://doi.org/10.3389/fpsyg.2024.1434478>
- Alvarez, R., & Wolfe, P. S. (2023). Communication development in autism spectrum disorder: A review of expressive language interventions. *Journal of Autism and Developmental Disorders*, *53*(6), 2458–2474. <https://doi.org/10.1007/s10803-022-05698-4>
- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed., text rev.). American Psychiatric Publishing.
- Bordini, S., Conson, M., & Ferrari, M. (2024). Augmentative and alternative communication interventions in autism spectrum disorder: A systematic review of outcomes and implementation factors. *Research in Developmental Disabilities*, *145*, Article 104640. <https://doi.org/10.1016/j.ridd.2024.104640>
- Forbes, H. J., Travers, J. C., & Johnson, J. V. (2024). A systematic review of acquisition and mastery of skills taught using the Picture Exchange Communication System. *Augmentative and Alternative Communication*. Advance online publication. <https://doi.org/10.1080/07434618.2024.2302154>
- Frost, L., & Bondy, A. (2023). *The Picture Exchange Communication System training manual* (Updated ed.). Pyramid Educational Consultants.
- Griffen, B., Holyfield, C., Lorah, E. R., & Caldwell, N. (2024). Increasing linguistic and prelinguistic communication for social closeness during naturalistic AAC instruction with young children on the autism spectrum. *Augmentative and Alternative Communication*, *40*(3), 168–181. <https://doi.org/10.1080/07434618.2023.2283846>
- Koudys, J., Perry, A., Magnacca, C., & McFee, K. (2023). Predictors of Picture Exchange Communication System (PECS) outcomes. *Journal of Developmental and Physical Disabilities*. Advance online publication. <https://doi.org/10.1177/23969415231221516>
- Liang, X., Chen, Y., & Huang, J. (2024). Visual supports and communication outcomes in children with autism spectrum disorder: A meta-analytic review. *Autism Research*, *17*(2), 312–328. <https://doi.org/10.1002/aur.2891>
- Liang, X., Zhang, Y., & Chen, H. (2024). Effects of structured visual supports on communication and participation among children with autism spectrum disorder. *Journal of Autism and Developmental Disorders*.
- Liu, J., Stephens, B., Abdoulqadir, C., & Loizides, F. (2023). *PECSOnline: A bespoke classroom-based Picture Exchange Communication System for children with autism*. In *Human-Computer Interaction—INTERACT 2023*. Springer.
- Logan, K., Iacono, T., & Trembath, D. (2024). Aided AAC interventions for children with autism spectrum disorder: Effects on expressive communication outcomes. *Augmentative and Alternative Communication*, *40*(2), 125–139. <https://doi.org/10.1080/07434618.2023.2263558>
- Paris, A. P., Denne, L. D., Grindle, C. F., May, R. M., Apanasionok, M. M., & Hastings, R. P. (2024). Facilitators and barriers to the implementation of the Picture Exchange Communication System: A

systematic review. *Frontiers in Education*, 9.
<https://doi.org/10.3389/feduc.2024.1206410>

Sukriananda, R. R., & Mangunsong, F. M. (2023). Intervensi Picture Exchange Communication System untuk meningkatkan komunikasi anak dengan autism spectrum disorder non-verbal. *Jurnal Pendidikan Khusus*, 19(2), 117–127.

Wandin, H., Lindström, E., & Hirvikoski, T. (2023). Visual-based communication interventions for individuals with autism spectrum disorder: Effects on language and participation. *Journal of Developmental and Physical Disabilities*, 35(4), 567–585. <https://doi.org/10.1007/s10882-023-09912-7>

White, E. N., Cagliani, R. R., & Tyson, K. M. (2023). Effects on speech development with modifications to Picture Exchange Communication System. *Focus on Autism and Other Developmental Disabilities*, 39(1), 14–23. <https://doi.org/10.1177/10883576231178266>