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The Effectiveness of the Picture Exchange Communication System Method on Listening Skills of Children with Attention Deficit Hyperactivity Disorder

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ABSTRACT
This study aims to determine the effectiveness of the Picture Exchange Communication System (PECS) method in improving the listening skills of children with Attention Deficit Hyperactivity Disorder (ADHD). The study was conducted at SD Negeri 113 Pekanbaru in the 2025/2026 academic year for four weeks, starting from the implementation of the pretest, intervention during four learning sessions, to the posttest. The study population was all students with Attention Deficit Hyperactivity Disorder (ADHD) at the school, while the research sample consisted of four students selected using a purposive sampling technique based on expert diagnosis and initial observation results. The instrument used in the study was a listening skills test developed based on five indicators according to Rangkuti (2024), namely understanding the storyline, understanding characters and roles, the ability to answer factual questions, actions or physical movements, and the ability to conclude moral values. Data analysis was carried out quantitatively by calculating the average score, gain score, N-Gain, and a paired sample t-test using the SPSS program to determine the significance of the difference in pretest and posttest scores. The results showed an increase in the average score from 6.75 in the pretest to 9.25 in the posttest. The paired sample t-test obtained a significance value of 0.030 ($p < 0.05$), indicating a significant difference between the scores before and after treatment. However, the N-Gain value of 0.198 is considered low, indicating that the increase was not significant. Overall, the PECS method was found to be effective in improving the listening skills of children with ADHD, although this improvement still requires reinforcement through more optimal training duration and intensity.

Keywords: picture exchange communication, listerning skills, children

Efektivitas Metode *Picture Exchange Communication System* terhadap Keterampilan Menyimak Anak *Attention Deficit Hyperactivity Disorder*

ABSTRAK
Penelitian ini bertujuan untuk mengetahui efektivitas metode *Picture Exchange Communication System* (PECS) dalam meningkatkan keterampilan menyimak anak *Attention Deficit Hyperactivity Disorder* (ADHD). Penelitian dilaksanakan di SD Negeri 113 Pekanbaru pada tahun ajaran 2025/2026 selama empat minggu, mulai dari pelaksanaan *pretest*, intervensi selama empat sesi pembelajaran, hingga *posttest*. Populasi penelitian adalah tujuh siswa *Attention Deficit Hyperactivity Disorder* (ADHD) di sekolah tersebut, sedangkan sampel penelitian berjumlah empat orang siswa yang dipilih dengan teknik *purposive sampling* berdasarkan diagnosis ahli dan hasil observasi awal. Instrumen yang digunakan dalam penelitian berupa tes keterampilan menyimak yang dikembangkan berdasarkan lima indikator menurut Rangkuti (2024), yaitu pemahaman alur cerita, pemahaman tokoh dan peran, kemampuan menjawab pertanyaan faktual, aksi atau gerak fisik, serta kemampuan menyimpulkan nilai moral. Analisis data dilakukan secara kuantitatif melalui perhitungan skor rata-rata, *gain score*, N-Gain, dan uji *paired sample t-test* menggunakan program SPSS untuk mengetahui signifikansi perbedaan nilai *pretest* dan *posttest*. Hasil penelitian menunjukkan bahwa terdapat peningkatan nilai rata-rata dari 6,75 pada *pretest* menjadi 9,25 pada *posttest*. Uji *paired sample t-test* memperoleh nilai signifikansi 0,030 ($p < 0,05$), sehingga terdapat perbedaan yang signifikan antara nilai sebelum dan sesudah perlakuan. Namun demikian, nilai N-Gain sebesar 0,198 termasuk kategori rendah, menandakan bahwa peningkatan yang terjadi belum tinggi. Secara keseluruhan, metode PECS dinyatakan efektif meningkatkan keterampilan menyimak anak ADHD, meskipun peningkatan tersebut masih memerlukan penguatan melalui durasi dan intensitas latihan yang lebih optimal.

Kata Kunci: *picture exchange communication, keterampilan menyimak,anak*

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INTRODUCTION

Listening skills are a basic language skill that plays a crucial role in the learning process because they serve as the foundation for the development of speaking, reading, and writing skills. Andries (2024), Sukma & Saifudin (2021), Razak (2020), and Rahmadayanti et al., 2023) explain that listening is a complex process that involves hearing, understanding, interpreting, and responding meaningfully to information. However, in learning practice, listening skills are often a weak aspect in elementary school students, especially when they have difficulty focusing on auditory stimuli provided by teachers. Difficulties in listening are more evident in children with Attention Deficit Hyperactivity Disorder (ADHD), a developmental disorder characterized by difficulty focusing attention, hyperactivity, and impulsive behavior. Gunawan (2021) states that these characteristics cause children with Attention Deficit Hyperactivity Disorder (ADHD) to be frequently distracted, have difficulty following verbal instructions, and fail to respond appropriately during the learning process. Mirnawati & Amka (2019) also emphasize that attention deficit disorders in children with Attention Deficit Hyperactivity Disorder (ADHD) impact the low ability to understand spoken messages, including during listening activities. These facts indicate that predominantly verbal-based learning is less suitable for children with Attention Deficit Hyperactivity Disorder (ADHD). In the context of inclusive elementary schools, teachers are required to provide learning strategies tailored to the needs of children with Attention Deficit Hyperactivity Disorder (ADHD) so they can participate effectively in learning.

One method considered appropriate is the Picture Exchange Communication System (PECS), a picture-based communication medium. Bondy (in Frost, 2020) explains that PECS is designed to enable children to understand and convey messages through a concrete and structured exchange of picture cards. Afmi et al. (2024) demonstrate that visual media such as the Picture Exchange Communication System (PECS) help children focus their attention and connect verbal information with visual symbols in a more focused manner. Sari and Sukerti (2020) also state that PECS has a positive effect on the development of receptive and expressive communication in children with special needs. Thus, the use of the Picture Exchange Communication System (PECS) has the potential to improve the listening skills of children with ADHD because this method provides strong and easy-to-understand visual support.

Theoretically, listening skills are understood as the ability to capture, understand, and respond to messages in spoken language (Sukma & Saifudin, 2021). Meanwhile, Attention Deficit Hyperactivity Disorder (ADHD) is a neurobiological disorder that causes attention deficits, impulsivity, and hyperactivity (Gunawan, 2021; Mirnawati & Amka, 2010). The Picture Exchange Communication System (PECS) is an image-based communication system that enables children to understand messages through clear and concrete visual representations (Bondy in Frost, 2020:18). Each of these variables plays a crucial role in the learning process of children with Attention Deficit Hyperactivity Disorder (ADHD), so their integration through the Picture Exchange Communication System (PECS) method has the potential to improve their listening skills in inclusive elementary school environments.

Several relevant previous studies have shown that the implementation of the Picture Exchange Communication System (PECS) has a positive impact on the communication and social interaction skills of children with special needs. Research by Sari & Sukerti (2020) demonstrated that the use of PECS in children with ADHD in an inclusive elementary school significantly reduced rejection behavior in social interactions. Before the intervention, children tended to withdraw and had difficulty understanding how to interact. However, after implementing PECS, children were able to process social information visually, showed a greater desire to play, and provided positive nonverbal responses. These findings indicate that PECS is effective in helping children with ADHD

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understand and respond to social interactions in a more structured manner.

Furthermore, research by Samara et al. (2025) examined the effectiveness of PECS in improving the vocabulary of children with Autism Spectrum Disorder (ASD) using a one-group pretest-posttest experimental design. The results showed an increase in vocabulary skills after five PECS intervention sessions. Although the study subjects were children with ASD, these findings are relevant to research on children with ADHD because both groups share similar characteristics of difficulties, particularly in communication, understanding verbal instructions, and listening and attention skills. Research by Juniayanti and Susila (2022) also corroborates these findings by demonstrating a significant improvement in the communication skills of autistic children after implementing PECS. The students' average communication skill scores increased substantially from before to after the intervention, indicating that PECS has a positive effect on helping children convey their desires and understand messages from others.

Based on these three studies, it can be concluded that the application of the PECS method is strongly related to this study because they both focus on improving the communication skills of children with special needs through a quantitative experimental approach with a one-group pretest-posttest design. These findings strengthen the basis for the PECS method being an effective intervention to support the communication and social interaction development of children with special needs, including children with ADHD.

METHOD

This research is quantitative and employs experimental methods. The design used is a One Group Pretest-Posttest, involving only one class as the experimental class, with no control class (Fraenkel at al., 2012; Razak, 2027; Mahsun, 2014). The observation conducted before (O1) is called the pretest, and the observation conducted after the experiment (O2) is called the posttest. This research was conducted at SD Negeri 113 Pekanbaru in the 2025/2026 academic year.

This research was conducted over four weeks, starting with the preparation stage, the pretest, the Picture Exchange Communication System (PECS) intervention method (four learning sessions), the posttest, and data analysis.

The population in this study was all students identified as having Attention Deficit Hyperactivity Disorder (ADHD) at SD Negeri 113 Pekanbaru, including four lower-grade students.

The sample in this study were students with Attention Deficit Hyperactivity Disorder (ADHD) in the lower grades of SD Negeri 113 Pekanbaru. Each group consisted of four students with Attention Deficit Hyperactivity Disorder (ADHD) attending SD Negeri 113 Pekanbaru.

The instrument used in this study was a listening skills test developed by the researcher based on listening indicators according to Rangkuti (2024), Fraenkel at al.(2012), Razak (2027). namely: understanding the storyline, understanding characters and roles, ability to answer factual questions, actions or physical movements, and ability to infer moral values. The data collection technique used a listening skills test administered twice: a pretest before treatment and a posttest after treatment. Data analysis was conducted quantitatively and descriptively using validity tests, calculating the average pretest and posttest scores, and then calculating the gain score and normalized gain (N-Gain). In addition to the descriptive analysis and gain score, the data were analyzed using a paired sample t-test and a normality test using the Statistical Package for the Social Sciences (SPSS) to test the significance of differences in pretest and posttest scores.

1) calculate the average pretest and posttest scores
2) calculating the pretest and posttest gain scores (difference in scores)
3) calculate Normalized Gain (N-Gain)

The gain index interpretation criteria proposed

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by Hake (Hamsir, 2017) are:

Table 1

Gain Index	Percentage	Criteria
g ≥ 0,70	70% - 100%	high
0,30 ≤ g < 0,70	30 % – 69 %	midle
g < 0.30	< 30%	low

RESULT

1. Pretest

In the pretest, students with ADHD were asked to listen to the story "Rafi, the Responsible Child" and answer questions orally. All students demonstrated low listening skills, with a total score of 27, with an average of 6.75. Descriptive analysis showed a minimum score of 5 and a maximum score of 8. These results confirm that students' listening skills are still in the poor category, characterized by difficulty understanding the plot, recognizing characters, and providing answers appropriate to the story.

Table 2

Descriptive Statistics					
	N	Min	Max	Mean	Std. Deviation
Pretest	4	5	8	0,302	1.500
Valid N (listwise)	4				

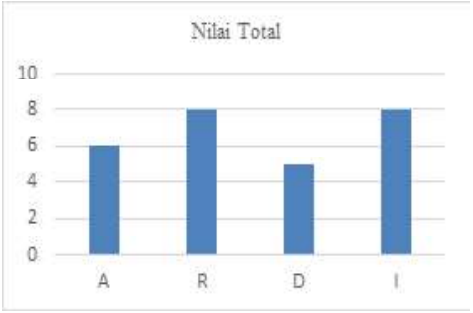

Figure 1
Graph of Student Pretest Results

2. Implementation of the Action

Following the pretest, four sessions of learning were conducted using the Picture Exchange Communication System (PECS). Each session was structured according to the PECS phases, from communication exercises to sentence structure development and question response. In the first and second sessions, using the story "Raka the Patient Child," students were introduced to the use of pictures as a communication tool. Although initially they exchanged pictures randomly and struggled to focus, they gradually began to understand the function of pictures and were able to select relevant images after repeating instructions. In the third and fourth sessions, using the story "Roni the Honest Child," students showed more consistent progress. They began to be able to exchange appropriate pictures, differentiate pictures based on the context of the story, and organize the pictures into simple sequences of events. Student focus and engagement improved, as evidenced by their ability to answer questions more accurately and understand the story's moral message.

3. Posttest

After four sessions of learning activities, a posttest was administered using the story "Rania and the Thousand Rupiah." The results showed clear improvement. Students scored 37 points with an average of 9.25. The minimum score is 6 and the maximum is 12. The average posttest score, which is in the sufficient category, indicates progress in understanding the plot, characters, events, and moral values ??of the story. Students also appeared more focused and able to provide more accurate answers compared to the pretest.

Table 3

Descriptive Statistics					
	N	Min	Max	Mean	Std. Deviation
Post-test	4	6	12	09.25	2.754
Valid N (listwise)	4				

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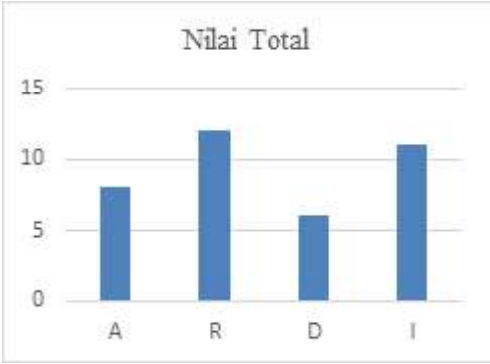

Figure 2
Graph of Student Posttest Results

4. Calculating Pretest and Posttest Scores

Based on the results of listening comprehension measurements conducted before and after implementing the Picture Exchange Communication System (PECS), pretest and posttest scores were obtained for four children with ADHD at Pekanbaru State Elementary School 113. In the pretest phase, the total score reached 27, while in the posttest phase, the total score increased to 37.

Table 4

No.	Sample Code	Pretest	Post-test
1	A	6	8
2	R	8	12
3	D	5	6
4	I	8	11
	Total	27	37

5. Calculating the Average Score

Based on the results of the listening skills assessment conducted before and after the implementation of the Picture Exchange Communication System (PECS), pretest and posttest scores were obtained from four children with Attention Deficit Hyperactivity Disorder (ADHD) at Pekanbaru State Elementary School 113.The data shows that at the pretest stage, the scores obtained by each student are listed in the table below.

Table 5

No.	Sample Code	Pretest
1	A	6
2	R	8
3	D	5
4	I	8
	Total	27
	Mean	6,75

The total pretest score was 27. To obtain the average, the total score was divided by the number of students, as follows:

Pretest average = 27/4
= 6.75

Therefore, the average pretest score of 6.75 indicates that before the Picture Exchange Communication System (PECS) treatment, children's listening skills were still relatively low. Children tended to have difficulty understanding the story, were unable to focus on the plot, and were less able to answer factual questions based on the story they heard. After the Picture Exchange Communication System (PECS) treatment, posttest results showed an increase in scores for all students, as follows.

Table 6
Average Posttest Score

No.	Sample Code	Post-test
1	A	8
2	R	12
3	D	6
4	I	11
	Total	37
	Mean	9,25

The total post-test score was 37. To obtain the average, the total score was divided by the number of students, as follows:

Pretest average = 37/4
= 9.25

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The average posttest score of 9.25 indicates an improvement in listening skills after the implementation of picture-based learning. Students began to understand the storyline, recognize characters and roles, and answer questions more accurately. Descriptively, comparing the average scores between the pretest (6.75) and posttest (9.25) showed an increase of 2.5 points. This indicates that the implementation of the Picture Exchange Communication System (PECS) method effectively helps children with Attention Deficit Hyperactivity Disorder (ADHD) improve their listening skills through visual support that facilitates comprehension of the story.

6. Calculating the Gain Score (Difference in Scores) between Pretest and Posttest

Based on the calculation of the Gain Score (difference in score) between the pretest and posttest scores, it was found that there was an improvement in listening skills in all children with Attention Deficit Hyperactivity Disorder (ADHD) after the implementation of the Picture Exchange Communication System (PECS) method. The total pretest score increased from 27 to 37 in the posttest, resulting in a total difference of 10 points. On average, the resulting Gain Score is 2.5.

Table 7

No.	Sample Code	Pretest	Post-tes	(Gain Score)
1	A	6	8	2
2	R	8	12	4
3	D	5	6	1
4	I	8	11	3

7. Normality Test

This study used the Shapiro-Wilk test for normality because the sample size was only four students with Attention Deficit Hyperactivity Disorder (ADHD). The analysis showed a significance value (Sig.) of 0.224 for the pretest data and 0.650 for the posttest data. Both values are greater than the 0.05 significance level, concluding that the pretest and posttest data are normally distributed. This finding indicates that the listening ability scores of children with Attention Deficit Hyperactivity Disorder (ADHD) before and after treatment using the Picture Exchange Communication System (PECS) method are within a normal distribution and do not deviate significantly. This means that the differences in scores are not due to irregularities in the data distribution, but rather to natural variation in learning outcomes.

Table 8

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.298	4	.	.849	4	.224
Post-test	.237	4	.	.939	4	.650

8. Hypothesis Testing

The hypothesis testing in this study was conducted using a paired sample t-test to determine the difference in listening skills of children with Attention Deficit Hyperactivity Disorder (ADHD) before and after the Picture Exchange Communication System (PECS) method was implemented. The analysis showed that the mean difference (mean difference) between the pretest and posttest results was -2.500, with a standard deviation of 1.291 and a standard error of 0.645. The t-value obtained was -3.873 with 3 degrees of freedom (df) and a 2-tailed significance value (Sig.) of 0.030. This significance value of 0.030 is lower than the established threshold of 0.05. This indicates that there is a difference between the pretest and posttest results in listening skills of children with Attention Deficit Hyperactivity Disorder (ADHD) after the Picture Exchange Communication System (PECS) method was implemented.

The negative mean difference indicates that the posttest score was higher than the pretest score, indicating that children's listening skills improved

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after implementing the Picture Exchange Communication System (PECS) method. Therefore, the results of this hypothesis test confirm that the implementation of the Picture Exchange Communication System (PECS) method is effective in improving the listening skills of children with Attention Deficit Hyperactivity Disorder (ADHD) at SD Negeri 113 Pekanbaru.

Table 9
Hypothesis Test

Paired Samples Test							
		Paired Differences			t	df	Sig. 2(tailed)
		Mean	Std. Deviation	SEM			
Pair 1	Pretest-Post-test	-2.500	1.291	.645	-3.873	3	.030

9. N-Gain Test

In this study, an average N-Gain value of 0.1982 was obtained from four children with Attention Deficit Hyperactivity Disorder (ADHD) at Pekanbaru State Elementary School 113. Based on general interpretation criteria, this N-Gain value is in the low category, indicating that listening skills did improve after implementing the Picture Exchange Communication System (PECS) method, but it was not significant. The data showed a minimum N-Gain value of 0.07 and a maximum of 0.33, indicating variation in improvement across students. Some children showed significant progress in understanding stories after learning with the aid of pictures, while others needed more time to adapt to this method.

Interpretatively, the N-Gain value of 0.1982 indicates that the Picture Exchange Communication System (PECS) method is effective in improving the listening skills of children with Attention Deficit Hyperactivity Disorder (ADHD). This low value may be due to the short duration of implementation, the varying levels of children's concentration, and the need for more intensive repetition to become accustomed to using pictures.

Table 10
N-Gain Test

Descriptive Statistics					
	N	Min	Max	Mean	Std. Deviation
N-Gain	4	.07	.33	.1982	.11734
Valid N (listwise)	4				

DISCUSSION

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The research results show that the Picture Exchange Communication System (PECS) method is effective in improving the listening skills of children with Attention Deficit Hyperactivity Disorder (ADHD) at Pekanbaru State Elementary School 113. Prior to the method's implementation, pretest results showed that all students were still in the low listening category. Students appeared to have difficulty focusing, understanding story content, recognizing characters, and answering questions accurately. This situation emphasizes the need for a learning strategy that combines visual and verbal media to suit the characteristics of children with Attention Deficit Hyperactivity Disorder (ADHD). During the four sessions of the Picture Exchange Communication System (PECS), students' progress gradually improved. In the first session, students still experienced significant difficulties following instructions, exchanging pictures, and focusing attention, indicating that the initial phase is a period of adaptation to visual symbols. These findings are supported by Wahyudi (2025), who stated that PECS only had an effect on the ability to follow instructions after children were repeatedly exposed to pictures and given live demonstrations on how to use pictures in communication. By the second session, progress began to be seen in the ability to select relevant pictures, although the children still required repetition of instructions and teacher assistance. In the third session, listening skills improved significantly; students became more responsive, able to correctly distinguish images, and follow the new storyline with better focus. In the fourth session, students showed the most significant improvement in their ability to sequence events, answer questions contextually, and convey the story's moral message more accurately. These four stages illustrate that the systematic steps of the Picture Exchange Communication System (PECS) help students gradually associate visual symbols with linguistic meaning, aligning with various previous research findings. These results align with Rusli and Safitri (2023), who found that the Picture Exchange Communication System (PECS) can help children understand sequences of events through systematic visual presentation. In the posttest, students showed more positive changes compared to the initial stage. They were able to maintain focus longer, recognize characters and storylines better, and provide more accurate and coherent answers. They also demonstrated greater enthusiasm and engagement during the activity. The posttest results demonstrate that the use of picture exchange media in the Picture Exchange Communication System (PECS) makes it easier for children with Attention Deficit Hyperactivity Disorder (ADHD) to understand information in a concrete and structured manner, thereby making the listening process more meaningful.

Overall, the improvement in performance between the pretest and posttest confirms that the Picture Exchange Communication System (PECS) method is not only effective in improving listening skills but also supports the development of focus, concentration, and communication skills in children with Attention Deficit Hyperactivity Disorder (ADHD). This finding supports various studies that suggest that the use of structured visual media significantly aids language comprehension in children with special needs. Therefore, the Picture Exchange Communication System (PECS) can be a relevant and effective alternative learning strategy for implementation in inclusive education.

CONCLUSION

The results of this study indicate that the Picture Exchange Communication System (PECS) method effectively improves the listening skills of students with Attention Deficit Hyperactivity Disorder (ADHD) at SD Negeri 113 Pekanbaru. Students' initial performance was low, as evidenced by the average pretest score of 6.75, reflecting difficulties in understanding the plot, recognizing characters, responding to instructions, and grasping the moral message. After intervention through four sessions of Picture Exchange Communication System (PECS)-based learning, the average posttest score increased to 9.25, indicating that the use of picture cards and visual sequences helped students comprehend information in a more structured and focused manner.

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The paired sample t-test yielded a significance value of 0.030 ($p<0.05$), confirming a significant difference between the pretest and posttest results. However, the N-Gain value of 0.198, which is in the low category, indicates that the practical effectiveness of the learning is still suboptimal, partly due to the limited duration of the intervention.

Overall, the Picture Exchange Communication System (PECS) method has been proven to be statistically effective in improving the listening skills of children with Attention Deficit Hyperactivity Disorder (ADHD). However, stronger improvements can be achieved through longer intervention duration, more intensive practice frequency, and more targeted learning support.

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