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The Effectiveness of Picture Story Media in Improving Early Childhood Cognitive Abilities at TKN Beiposo

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ABSTRACT

This study aims to determine the extent to which picture story media is effective in improving early childhood abilities at TKN Beiposo. The research method used was a pre-experimental design with a one-group pretest–posttest design. The research subjects were children in group B1 aged 5–6 years at TKN Beiposo. Data were collected through pretest and posttest, then analyzed using a paired sample t-test. Based on descriptive statistical results, children's cognitive abilities before treatment (pretest) had a mean score of 18.07 with a standard deviation of 5.08 and a standard error of 1.31 from a total sample of 15 children. This value indicates that children's cognitive abilities at the initial stage were relatively low and showed variation among individuals. After being given treatment in the form of learning using picture story media, the average cognitive ability score in the posttest increased to 36.00, with a standard deviation of 6.05 and a standard error of 1.56, indicating a significant

improvement in cognitive abilities after the intervention. Thus, child-friendly picture story media has proven to be effective and can be used as an alternative learning medium that is innovative, engaging, and appropriate to the characteristics of early childhood.

Introduction

Early childhood development is a crucial phase in shaping character, intelligence, and individual potential. This period is known as the *golden age*, during which the child's brain develops rapidly and is highly responsive to various forms of stimulation. One of the important aspects of child development is cognitive ability, which includes the ability to think, understand, remember, and solve problems. Well-developed cognitive abilities serve as a foundation for children to learn and adapt to social and academic environments in the future. Therefore, early childhood education must be designed holistically and creatively to stimulate all aspects of development, including cognitive development.

Nurwijayanti (2025) states that early childhood cognitive ability includes the ability to recognize and name various objects in the surrounding environment such as object names, colors, shapes, patterns, sizes, as well as problem-solving skills. She emphasizes that positive environments such as schools and families play an important role in supporting children's cognitive development. Usdarta & Nurlan (2024) add that cognitive development is a continuous process that is not always linear, but occurs through stages influenced by new experiences

and the accommodation of informational imbalances. Children learn actively and dynamically according to the context and experiences they encounter.

Susanto (2024) explains that cognitive ability is a thinking process that includes an individual's ability to connect, assess, and consider an event or information. In the context of early childhood, this ability becomes the basis for intellectual development and learning readiness.

Eku et al. (2023) state that thinking ability is characterized by mental activities such as remembering, understanding, and problem-solving. Children are capable of thinking, learning, remembering, and communicating because their cognitive processes are no longer egocentric. The formal operational stage (11–15 years) is marked by a transition to abstract thinking. This ability can be seen through the capacity to express ideas, predict future events, and engage in scientific thinking processes, such as formulating hypotheses and determining ways to test their validity.

Picture storybooks are books that convey messages through two complementary forms, namely narration and illustration, presented as a unified whole, and generally use simple language. Children's storybooks equipped with images relevant to the story topic can serve as an effective learning medium (Alfiatul & Kurniawan, 2022). According to Nurgiantoro (2018), picture story media refers to books that deliver messages through both images and text. These elements do not stand independently but complement and support each other in

conveying meaning. Faizah (in Suryaningsih & Fatmawati, 2017) explains that picture storybooks are written in a simple, conversational style and are supported by illustrations to convey specific ideas. Storytelling is one form of stimulation that is highly suitable for early childhood characteristics. Telling stories is a way to communicate information orally, and it can be done through various methods, including spontaneous storytelling and the use of concrete objects. Puppets, single images, picture sequences, flannel board illustrations, and books are examples of indirect media that can be used in storytelling (Tambunan, 2019).

Picture story media is a type of medium that contains stories accompanied by attractive, engaging, and enjoyable illustrations, which encourage children to develop an interest in reading and make reading a necessary habit (Kesumadewi et al., 2020). According to Lidya & Hamidah (2022), picture storybooks are interactive media that allow users to engage in two-way communication. Rahmaniyah (2022:830) defines picture storybooks as books that integrate images and text into a unified narrative, where both elements are interrelated rather than independent. Desmita states that cognitive ability is one aspect of human development related to understanding (knowledge), encompassing all psychological processes involved in how individuals learn about and think about their environment.

Apriliani & Radia (2020) argue that picture storybooks attract children's attention due to their appealing visual presentation. These

books function as both decorative and supportive elements in storytelling, helping to facilitate comprehension. Picture storybooks are a unified narrative accompanied by illustrations. They also help children express ideas in language form, as images provide inspiration and strong motivation for students to engage in learning, especially in reading activities. Visual media can strengthen memory and make it easier for children to understand the content of a story (Afnida et al., 2016). Puspitasari (2022) states that children's cognitive intelligence can be observed through the emergence of ideas and learning processes. Cognitive ability is essential for developing knowledge based on what children see, feel, and hear through their senses (Wulandari, 2019).

Based on initial observations conducted by the researcher in class B1 at TKN Beiposo, it was found that some children's cognitive abilities had not yet developed optimally. One solution that can be applied by teachers to address this issue is the use of child-friendly picture story media. This media combines visual and textual elements that complement each other, thereby attracting attention, facilitating concept understanding, and stimulating imagination as well as logical thinking skills (Alfiatul & Kurniawan, 2022). Nurgiantoro (2018) also states that picture storybooks have the strength to convey messages through a combination of visuals and narratives. Meanwhile, Tambunan (2019) emphasizes that storytelling activities supported by visual media help children understand story content concretely and enjoyably.

Based on the background described above, this study was

conducted to describe the extent to which the effectiveness of child-friendly picture story media can improve early childhood cognitive abilities at TKN Beiposo.

Methods

This study employed a pre-experimental method using a One Group Pretest–Posttest Design (Riyanto & Hatmawan, 2020). This design was selected because it involves only one group of subjects who are given treatment without a comparison (control) group (Agustianti et al., 2022). The purpose of this design is to determine the effectiveness of picture story media in improving early childhood cognitive abilities.

In its implementation, children were first given an initial test (pretest) to measure their cognitive abilities before learning using picture story media. Afterward, they were given treatment in the form of learning activities using picture story media over several sessions (Aida et al., 2025). Once the treatment was completed, the children were given a final test (posttest) to determine changes or improvements in cognitive abilities after the intervention.

The research design can be illustrated as follows:

Group	Pretest	Treatment	Posttest
One group of children	O_1	X	O_2

Description:

O_1 = Initial test before treatment

X = Treatment using picture story media

O_2 = Final test after treatment

Through this design, the researcher can compare the results before and after treatment to determine whether there is an improvement in children's cognitive abilities following learning with picture story media.

Research Setting and Time

This research was conducted at Taman Kanak-Kanak Negeri (TKN) Beiposo, which was selected because it has adequate learning facilities and teachers who are open to innovative learning media. In addition, the children at this school have characteristics that align with the research focus, namely children aged 5–6 years.

The study was planned to take place over one month, covering the preparation stage (instrument development and coordination), implementation stage (pretest, treatment, and posttest), and data analysis stage.

The subjects of this study were children in group B (aged 5–6 years) at TKN Beiposo. The total number of children in one class was approximately 16, all of whom were involved as research participants. The selection of subjects was carried out using purposive sampling, based on specific considerations—namely children who were able to communicate well and actively participate in learning activities using picture story media.

Research Subjects

The subjects in this study were children in group B1 (aged 5–6 years)

at TKN Beiposo. The number of children in the class was approximately 16, and all were involved as research participants.

The selection of subjects used purposive sampling techniques, based on certain considerations—specifically, children who were able to communicate effectively and actively engage in learning activities using picture story media.

Research Variables

This study consisted of two main variables:

- **Independent variable:** The use of picture story media
- **Dependent variable:** Early childhood cognitive ability

Picture story media in this study includes illustrated books and visual aids designed to help children understand story content through observing images, recognizing story sequences, and developing logical thinking and imagination.

Implementation Stages

The implementation stage was conducted in three phases:

1. Pretest (Initial Test)

Before the treatment, children were given a test to measure their initial cognitive abilities. The test was conducted in the form of simple activities such as retelling stories, naming characters, and answering questions based on images.

2. Treatment

Children participated in learning activities using picture story media for 4–6 sessions. Teachers used various media such as picture

storybooks, flannel boards, and picture sequences to help children understand the story content.

The activities included: reading stories together, observing images, discussing story content, and answering questions related to plot and characters. Through these activities, children were expected to develop logical thinking skills, remember story sequences, and understand cause-and-effect relationships.

3. Posttest (Final Test)

After all treatments were completed, children were given a test again using the same format as the pretest. The purpose was to determine the extent of improvement in children's cognitive abilities after learning using picture story media.

Data Analysis Technique (Quantitative Analysis)

Data obtained from the pretest and posttest were analyzed using the following steps:

- **Mean difference test within the group (pretest–posttest):**

  Using the **paired sample t-test** to determine whether there is a significant difference between scores before and after treatment.

Result and Discussions

Based on the results of data analysis using the paired samples t-test, a clear picture was obtained regarding the improvement in learning outcomes after the treatment was administered, as reflected in the pretest and posttest results.

Table 1. Paired Samples Statistics

Paired Samples Statistics					
		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	Pretest	18.0667	15	5.07749	1.31100
	Posttest	36.0000	15	6.04743	1.56144

From Table 1 (Paired Samples Statistics) regarding the effectiveness of picture story media in improving early childhood cognitive abilities, it can be seen that the average cognitive ability score of children increased significantly after the treatment. The mean pretest score was 18.07 with a standard deviation of 5.08 and a standard error of 1.31, indicating that before the use of picture story media, the cognitive abilities of the children in this study tended to be low and varied among participants.

After the intervention using picture story media, the mean posttest score increased to 36.00 with a standard deviation of 6.05 and a standard error of 1.56, showing a substantial improvement in cognitive abilities among early childhood participants.

Table 2. Paired Samples Test

Paired Samples Test						
		Paired Differences			Significance	
		95% Confidence Interval of the Difference				
		Upper	T	df	One-Sided p	Two-Sided p
Pair 1	Pretest - Posttest	-15.12931	-13.717	14	<,001	<,001

Based on the results of the paired samples t-test analysis in Table 2, there is a very significant improvement in learning outcomes between conditions before and after the treatment. The average pretest score was 18.07 with a standard deviation of 5.08, while the average posttest score increased to 36.00 with a standard deviation of 6.05. The mean difference between the two measurements was −17.93, indicating a substantial increase in scores after the treatment was applied.

The paired t-test produced a value of t = −13.717 with degrees of freedom (df) = 14 and a significance level of $p < 0.001$ for both one-tailed and two-tailed tests. Since the p-value is far below the significance level of 0.05, it can be concluded that there is a significant difference between pretest and posttest scores, indicating that the treatment was effective in improving students' learning outcomes.

In addition to statistical significance, the magnitude of the treatment effect is reflected in the effect size. The Cohen's d value of −3.54 and Hedges' g value of −3.35 indicate a very large effect size, suggesting that the improvement is not only statistically significant but

also practically meaningful in the learning context.

Table 3. Paired Samples Correlations

Paired Samples Correlations					
				Significance	
		N	Correlation	One-Sided p	Two-Sided p
Pair 1	Pretest & Posttest	15	.598	.009	.019

The correlation analysis results in Table 3 show a significant relationship between pretest and posttest scores among early childhood participants after the use of picture story media. With a total of 15 respondents, the correlation coefficient of 0.598 indicates a moderate positive relationship between cognitive abilities before and after the intervention. This means that higher pretest scores tend to be followed by higher posttest scores after the treatment.

The two-tailed significance value of $p = 0.019$ (< 0.05) indicates that this relationship is statistically significant and not due to chance. Therefore, the improvement in children's cognitive abilities after using the media is meaningful (Gravetter & Wallnau, 2017).

Table 4. Paired Samples Test

Paired Samples Test				
	Paired Differences			
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference

					Lower
Pair 1	Pretest - Posttest	-17.93333	5.06341	1.30737	-20.73735

The results of the paired samples test further confirm a clear difference between children's cognitive abilities before and after the implementation of picture story media. The mean difference of −17.93 indicates a substantial improvement in cognitive ability scores after the treatment compared to before. The negative value indicates that posttest scores are higher than pretest scores.

The standard deviation of 5.06 and standard error mean of 1.31 indicate relatively homogeneous data and stable measurement results. The 95% confidence interval, which lies entirely in the negative range, further confirms that the improvement occurred consistently across most participants. Thus, these findings provide strong statistical evidence that the use of picture story media is effective in improving early childhood cognitive abilities.

Table 5. Paired Samples Effect Sizes

Paired Samples Effect Sizes					
					95% Confidence Interval
			Standardizer[a]	Point Estimate	Lower
Pair 1	Pretest - Posttest	Cohen's d	5.06341	-3.542	-4.926
		Hedges' correction	5.35647	-3.348	-4.656

Based on Table 5, the use of picture story media has a very strong impact on improving early childhood cognitive abilities. The effect size calculated using Cohen's d is −3.542, which falls into the very large effect category. This indicates a substantial difference between cognitive abilities before and after the intervention.

The 95% confidence interval, which remains in the negative range, reinforces the consistency of improvement after treatment. Additionally, the Hedges' correction value of −3.348 confirms that even after adjusting for a relatively small sample size, the effect remains very large. Thus, these findings demonstrate that picture story media is highly effective as a learning strategy for improving early childhood cognitive abilities, as it provides both visual and narrative stimuli aligned with children's developmental characteristics.

Discussion

The overall findings of this study indicate that the use of picture story media is proven to be effective in improving early childhood cognitive abilities. This effectiveness is reflected in descriptive statistical results, paired sample tests, correlation analysis, and effect size measurements, all of which consistently show improvement after the intervention.

Based on Table 1 (Paired Samples Statistics), the mean cognitive ability score at the initial stage (pretest) was 18.07 with a standard deviation of 5.08, indicating relatively low cognitive ability and variability among children. This suggests that children had not yet

received optimal learning stimulation for developing cognitive aspects such as thinking, understanding simple concepts, and problem-solving.

After implementing picture story media, the mean posttest score increased significantly to 36.00 with a standard deviation of 6.05. This improvement indicates that picture story media provides a more concrete, engaging, and meaningful learning experience through the integration of visuals and narratives, making it easier for children to understand learning materials.

Furthermore, the correlation analysis (Table 3) shows a significant positive relationship ($r = 0.598$), categorized as moderate, indicating that children with higher initial abilities tend to achieve better outcomes after treatment. The significance value ($p = 0.019 < 0.05$) confirms that this relationship is statistically meaningful. This finding suggests that picture story media works consistently across different levels of initial ability, making it broadly applicable in early childhood education.

The results of the paired samples test (Table 4) confirm a clear difference between pretest and posttest scores, with a mean difference of −17.93. The consistency of improvement across participants is reinforced by the confidence interval and stable standard error values.

The strength of the treatment effect is further supported by Table 5, where Cohen's d (−3.542) and Hedges' g (−3.348) indicate a very large effect size. This demonstrates that the intervention is not only statistically significant but also highly meaningful in practical

educational contexts.

According to Pall (2020), paired t-tests are used to compare two conditions within the same group, and significant results indicate that the intervention has an effect on the studied variable. With $p < 0.001$, this study confirms that the observed improvement is not due to chance but is a direct result of the intervention. Sugiyono (2019) also states that consistent increases from pretest to posttest indicate successful experimental treatment.

Theoretically, these findings align with Piaget's cognitive development theory, which states that early childhood learners are in the preoperational stage and require concrete, visual, and contextual learning experiences. Picture story media provides visual stimuli that support assimilation and accommodation processes (Piaget in Suyanto & Jihad, 2021).

Additionally, Vygotsky's constructivist theory emphasizes the importance of social interaction and scaffolding in learning (Mayer, 2020). Picture story media functions as a mediating tool that helps children construct knowledge through language, images, and interaction with teachers and peers (Vygotsky in Nugraha et al., 2022).

Moreover, this media aligns with multimedia learning theory, which states that learning is more effective when multiple sensory channels are engaged. The combination of images and narration enhances attention, memory, and comprehension (Mayer, 2020).

Previous studies also support these findings. Arsyad (2019) and Mayer (2020) highlight that combining text and images enhances learning effectiveness. Lestari & Sari (2023) found that picture story media significantly improves logical thinking, memory, and conceptual understanding. Similarly, Rahmawati et al. (2024) reported that picture story media effectively enhances cognitive abilities by linking visual experiences with thinking processes.

Thus, this study reinforces existing empirical evidence and confirms that picture story media is an effective tool for improving early childhood cognitive development.

Conclusion

Based on the results and discussion regarding the effectiveness of picture story media in improving early childhood cognitive abilities at TKN Beiposo, it can be concluded that the use of picture story media has been proven to be effective in enhancing the cognitive abilities of group B1 children aged 5–6 years. This is evidenced by a significant increase in the average cognitive ability scores between the pretest and posttest results after the implementation of learning using picture story media. The statistical analysis using the paired samples t-test shows a significant difference between children's cognitive abilities before and after the treatment, with a significance value of $p < 0.001$.

In addition, the very large effect size indicates that the improvement is not only statistically significant but also has strong practical significance in the context of early childhood learning. Picture

story media is able to attract children's attention, help them understand story plots, recognize characters, remember sequences of events, and stimulate logical and imaginative thinking skills. Thus, child-friendly picture story media can be used as an alternative learning medium that is innovative, enjoyable, and aligned with the developmental characteristics of early childhood in supporting the optimal improvement of cognitive abilities.

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