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The Effect of the Problem-Based Learning Model Assisted by Pop-Up Books on the Critical Thinking Skills of Fourth Grade Students in the IPAS Subject

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Abstract

This study aims to examine the effect of the Problem-Based Learning (PBL) model assisted by pop-up book media on the critical thinking skills of fourth-grade students in the IPAS subject. The research employed a quantitative approach using a quasi-experimental design with a posttest-only control group design. The sample consisted of two classes: the experimental group, which used the PBL model with pop-up book assistance, and the control group, which used the cooperative Think Pair Share method. The research instrument was a multiple-choice test based on indicators of critical thinking skills. The data analysis revealed a significant difference in posttest scores between experimental and control groups. The experimental group achieved higher learning outcomes, indicating that the combination of PBL and visual media such as pop-up books effectively enhances students' critical thinking skills. The novelty of this research lies in the integration of a problem-based learning model and visual media in IPAS instruction, particularly for fourth-grade students who had never used such media before. This approach has proven to encourage active student engagement and provide a more enjoyable and meaningful learning experience.

Keywords: *Problem Based Learning, Pop-up Book, Critical Thinking, IPAS*

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INTRODUCTION

Education plays a crucial role in shaping students' thinking abilities (Darwati & Purana, 2021), including their critical thinking skills. These skills are essential for students to not only receive information passively, but also to analyze, evaluate, and make wise decisions. Through the educational process, students are trained to become independent, careful, and responsible individuals (Ujud, 2023). From an Islamic perspective, knowledge holds a highly esteemed position. Education is not merely a means to broaden one's horizons but also a path to strengthen one's faith (Rika, Fahrudin, & Sumarna, 2020). The Qur'an, Surah An-Nur verse 35, describes

Allah as the source of light, with knowledge being likened to the light that illuminates human life, including how one thinks and makes decisions.

Critical thinking skills are increasingly relevant to be instilled from the elementary level (Nur, Santoso, & Akbar, 2019). Children need to be accustomed to thinking logically, openly, and independently solving problems (Stialis, Wulansari, & Muttaqin, 2024). However, based on observations conducted at MIN 10 Bandar Lampung from November 18–21, 2024, learning in Grade IV is still dominated by lecture-based methods. Students appear to be less active in the learning process, seldom ask questions, and are reluctant to express their opinions. Interviews with the IPAS teacher also revealed several obstacles, such as differences in students' levels of comprehension, the use of monotonous teaching methods, and a lack of engaging learning media. As a result, most students have not yet achieved the expected critical thinking skills, as indicated by the initial test results that did not meet the Learning Objectives Achievement Criteria (KKTP).

As a subject that integrates elements of natural and social sciences, IPAS should serve as an effective medium for developing students' critical thinking abilities (Anggita, 2023). However, this potential is difficult to realize if the learning process is not designed to be innovative and interactive. Therefore, a teaching approach that fosters student engagement, creativity, and reasoning is essential. One relevant model is Problem-Based Learning (PBL), which focuses on solving real-life problems (Ramadhan, 2021). PBL is considered effective in enhancing student participation and understanding (Asiah, Hamidah, & Rahmawati, 2024). Nevertheless, the effectiveness of PBL can be further optimized when supported by engaging media that matches the characteristics of elementary school students. One promising medium is the pop-up book, which is capable of capturing students' attention and presenting material in a concrete and enjoyable manner (Nabila, Adha, & Febriandi, 2021).

Various previous studies have shown that the Problem-Based Learning (PBL) model and pop-up book media positively contribute to improving students' critical thinking skills. (Kurnia, Putri, & Purwanti, 2023) demonstrated that implementing PBL with the assistance of pop-up books significantly increased the average scores of students' critical thinking skills. Another study by (Putri, Duwi, & Suyitno, 2023) supported these findings. Additionally, (Suroiha, Dewi, & Wibowo, 2021) concluded that pop-up book media is effective in enhancing students' interest and understanding of the learning material. On the other hand, (Tande, 2020) revealed that implementing PBL in general has a positive impact on elementary school students' critical thinking abilities.

However, most of these studies were conducted in fifth-grade classes, focusing either on media development or on the implementation of teaching

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methods separately. Furthermore, there is still a lack of research that specifically integrates the PBL model with pop-up book media in IPAS instruction for fourth-grade students, particularly those who have never used such media before. In fact, fourth-grade students are in a critical stage of cognitive development, requiring contextual and visual learning approaches to facilitate higher-order thinking processes such as critical thinking.

Based on this context, this study aims to fill the research gap by examining the effect of the Problem-Based Learning (PBL) model assisted by pop-up book media on the critical thinking skills of fourth-grade students in the IPAS subject. The objective of this study is to test the influence of implementing the Problem-Based Learning model supported by pop-up books on the critical thinking abilities of fourth-grade students in IPAS learning.

METHOD

This study employed a quantitative approach with a quasi-experimental design. The purpose of the study was to examine the effect of the Problem-Based Learning (PBL) model assisted by pop-up books on students' critical thinking skills. The design used was a Posttest-Only Control Group Design, consisting of two groups: the experimental group and the control group. The experimental group received instruction using the PBL model with pop-up book support, while the control group was taught using the cooperative Think-Pair-Share (TPS) learning model.

The research was conducted in the second semester of the 2024/2025 academic year in fourth-grade classes at MIN 10 Bandar Lampung. The population of the study consisted of all fourth-grade students, totaling 134 individuals. The sampling technique used was simple random sampling, with the random selection resulting in class IV A as the experimental group and class IV B as the control group.

The research instrument was a multiple-choice test consisting of 16 items developed based on critical thinking indicators, which included: problem formulation, analysis, evaluation, and drawing conclusions. Validity was tested using the Pearson Product Moment correlation (Ketaren, 2024), and reliability was tested using the Cronbach Alpha formula (Slamet & Wahyuningsih, 2022).

Before testing the hypothesis, prerequisite tests were conducted, including a normality test using the Kolmogorov-Smirnov test and a homogeneity test using the Fisher test (Usmadi, 2020):

The hypothesis testing was carried out using a two-tailed independent samples t-test (Yam & Taufik, 2021). All calculations were supported by IBM SPSS software version 25.

RESULTS AND DISCUSSION

Table 1. Results of the Posttest Mean Score Analysis

Descriptive Statistics

	N	Range	Minimum	Maximum	Mean	Std. Deviation
postes	33	69	31	100	94.48	12.505
postes	35	50	50	100	86.89	14.800
Valid N (listwise)	68					

The results of the descriptive analysis showed that the average posttest score of students in the experimental group was 94.48 with a standard deviation of 12.505, while the control group had an average score of 86.89 with a standard deviation of 14.800. The minimum and maximum scores in the experimental group were 31 and 100, respectively, whereas in the control group, they were 50 and 100. The score range in the experimental group was 69, which is higher than the control group's range of 50. Although the experimental group had a higher mean score, the relatively large standard deviation in both groups indicates significant individual variability in learning outcomes. This suggests that not all students experienced uniform improvement, and therefore, the effectiveness of the instructional method still needs to be further evaluated in the context of diverse classroom implementation.

Table 2. Normality Test Results

Tests of Normality

		Kolmogorov-Smirnov[a]			Shapiro-Wilk		
Kelas		Statistic	df	Sig.	Statistic	Df	Sig.
hasil posttes peserta didik	posttes ekperimen	.098	33	.200*	.950	33	.130
	posttes control	.106	35	.200*	.961	35	.253

*. This is a lower bound of the true significance.

The normality test for students' posttest data was conducted using the Kolmogorov–Smirnov and Shapiro–Wilk tests. Based on the Shapiro–Wilk test results, the significance value for the posttest data in the experimental group was 0.130, while in the control group it was 0.253. Both significance values are greater than the significance level of 0.05, indicating that the posttest data in both groups are normally distributed. Similarly, the Kolmogorov–Smirnov test yielded a significance value of 0.200 (lower bound), which also supports that the data meet the assumption of normality. This means the posttest data from both groups fulfils the normality requirement for further parametric statistical analysis.

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Table 3. Homogeneity Test Results

Test of Homogeneity of Variances

		Levene Statistic	df1	df2	Sig.
Hasil	Based on Mean	.154	1	66	.696
	Based on Median	.264	1	66	.609
	Based on Median and with adjusted df	.264	1	62.559	.609
	Based on trimmed mean	.247	1	66	.621

A test for homogeneity of variances was conducted using Levene's Test to ensure equality of variances between the groups. Based on the Levene test using the mean-based approach, the test yielded a statistic of 0.154 with a significant value of 0.696 ($p > 0.05$). Additionally, the tests based on the median and trimmed mean showed significance values greater than 0.05, namely 0.609 and 0.621, respectively. Since all methods yielded significance values above the 0.05 threshold, it can be concluded that the variances of the two groups are homogeneous. Thus, the assumption of homogeneity of variances is met, allowing the use of a parametric test such as the independent samples t-test.

The t-test was conducted to determine whether there was a significant difference between the posttest results of students in the experimental and control groups. Based on Levene's Test for Equality of Variances, a significance value of 0.696 ($p > 0.05$) was obtained, indicating that the variances of the two groups are homogeneous. Therefore, the interpretation of the t-test refers to the row labeled "Equal variances assumed." The t-test results showed a t-value of 4.393 with 66 degrees of freedom (df), and a two-tailed significance value of 0.000 ($p < 0.05$). This indicates a significant difference between the posttest scores of the two groups. The mean difference between the experimental and control groups was 7.120, with a standard error of 1.621. The 95% confidence interval for the mean difference ranged from 3.884 to 10.356. Accordingly, the Problem-Based Learning model supported by pop-up books was proven to have a significant impact on improving students' critical thinking skills compared to the Think Pair Share method.

The study results demonstrate that there is a significant difference between the posttest scores of students in experimental and control classes. The group that used the Problem-Based Learning (PBL) model supported by pop-up books achieved higher average scores than the group that used the Think Pair Share (TPS) method. This indicates that the application of PBL with pop-up book media can effectively enhance students' critical thinking skills.

This finding aligns with the research of (Kurnia, Putri, & Purwanti, 2023), who stated that implementing PBL supported by pop-up book media has a positive effect on sharpening students' critical thinking skills through active engagement in problem identification and decision-making processes. Additionally, (Atmojo,

2024) revealed that the PBL model fosters students' analytical abilities in IPAS learning by providing opportunities for in-depth idea exploration.

Although the results indicate the positive impact of the Problem-Based Learning model assisted by pop-up books on students' critical thinking skills, this study has several limitations that need to be acknowledged. Factors such as differences in teachers' instructional styles, students' academic backgrounds, and potential bias in the implementation of classroom instruction may also influence the outcomes. Therefore, further studies with stricter control of variables and more diverse samples are strongly recommended to strengthen the generalizability of the findings and to explore other contributing factors to the effectiveness of this learning model.

CONCLUSION

Based on the results of the analysis, this study concludes that the implementation of the Problem-Based Learning (PBL) model supported by pop-up book media has a significant effect on improving the critical thinking skills of fourth-grade students in the IPAS (Science and Social Studies) subject at MIN 10 Bandar Lampung. The integration of a problem-solving-based learning model with engaging visual media has proven effective in creating a more active, contextual, and meaningful learning experience. The novelty of this study lies in the combination of PBL and pop-up books in IPAS instruction for fourth-grade students who had never used such media before, thus offering a specific contribution to the development of innovative learning strategies in elementary education.

In light of these findings, the use of active and innovative instructional approaches such as Problem Based Learning (PBL) and visually engaging media like pop-up books may be considered as effective alternatives to enhance the quality of IPAS learning, particularly in fostering students' critical thinking skills. This study also opens up opportunities for future researchers to continue or expand similar investigations at different educational levels, in other subjects, or using various learning media—thereby enriching pedagogical strategies that support the optimal development of critical thinking skills.

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