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The Effectiveness of Problem-Based Learning Assisted by Canva and Learning Interest on Critical Thinking Skills in 4th Grade

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Abstract. Every human being is required to have the ability to be able to adapt to the times, one of which is the ability to think critically. However, students' critical thinking skills are still not good or lacking. The purpose of this study was to determine the effect of the Problem Based Learning learning model assisted by Canva on critical thinking skills. To determine the effect of students' interest in learning on critical thinking skills. To determine the interaction of the learning model and ask students to learn critical thinking skills. The method used is quantitative. The subjects in this study were fourth grade students. Data collection techniques with tests and questionnaires. The sample in this study amounted to 93 students with random sampling. Data analysis techniques to test the hypothesis using two-way Anova. The results showed that there was a significant effect of using the Problem Based Learning learning model assisted by Canva on critical thinking skills, there was a significant effect of learning interest on critical thinking skills, there was no interaction between learning models and learning interest on critical thinking skills.

Keywords: Learning Model, Canva-assisted Problem Based Learning, Interest In Learning, Critical Thinking Skills.

1. Introduction

In the 21st century, humans are required to have the ability to adapt to the times. These abilities include critical thinking, creativity, communication, and collaboration [1]. Critical thinking is important for preparing students to deal with various problems they encounter everyday life [2]. Critical thinking skills can improve learners academic achievement and also prepare them to face future challenges with better thinking skills [3].

However, the reality in the field does not match expectations. The results of the 2018 PISA survey placed Indonesia in 74th place out of 80 countries. The reading ability of Indonesian students at a score of 371 is in 74th position, mathematics ability gets

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379 is in 73rd position, and science ability with a score of 396 is in position 71. These rankings indicate that Indonesia has a low standing globally. This suggests that students' critical thinking skills are still weak, which impacts their overall academic performance [4]. Based on the results of interviews with SDN 03 Taman Madiun city teachers on May 19, 2023, they stated that the critical thinking skills of students are still not good or lacking. This is characterized by not fulfilling the indicators of critical thinking skills [5]. Most students have not been able to provide an explanation of the answers they give [6].

Critical thinking, learning interest, and Problem-Based Learning (PBL) are theoretically interconnected [7], [8]. Critical thinking provides the cognitive foundation for analyzing and evaluating information, while learning interest strengthens students' motivation and engagement in learning activities. PBL integrates both elements by situating learning in real-world problem contexts that require investigation, analysis, collaboration, and reflection. This theoretical alignment justifies why these three constructs are highly relevant for addressing Indonesia's challenges in PISA performance.

Despite this theoretical relevance, current classroom practices in Indonesian elementary schools still rely heavily on memorization based and teacher centered instruction [9]. Such practices create a clear gap between what should ideally support critical thinking development and what happens in actual teaching. Therefore, strengthening learning designs that promote inquiry, autonomy, and higher-order thinking is urgently needed, especially in early grades where foundational cognitive skills are established.

Previous research has indeed explored the effectiveness of PBL; however, limited studies have examined how Canva specifically supports each stage of PBL problem presentation, investigation, collaboration, and reflection. Canva's visual, collaborative, and interactive features provide cognitive support that may enhance students' analytical and reasoning processes. This gap highlights the novelty and urgency of investigating Canva-assisted PBL in the context of elementary education.

The cause of critical thinking skills that are not as expected is the lack of application of learning that can stimulate students to think critically [10]. In line with with several studies which states that one of the factors affecting students' critical thinking skills in basic education is the lack of interactive teaching methods [11], [12]. Learning with a conventional approach emphasizes learning to memorize [13]. If the learning approach emphasizes on memorizing and receiving information without any challenge to analyze or evaluate, learners may not be trained to think critically due to the dominance of teacher-centered learning [14]. Learning that only focuses on teaching facts or routines without providing opportunities to discuss or solve real problems reduces the opportunity for learners to develop critical thinking skills [15]. The lack of use of learning strategies that require students to think critically and learning in the classroom is still dominated by the teacher [16], so that students are not given the opportunity to think critically [17]. Thus, learning approaches and models that are not aligned with critical thinking development fail to enhance students' cognitive abilities[18].

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Another important factor that influences critical thinking skills is students' interest in learning. Each student's level of engagement and enthusiasm for learning significantly impacts their ability to develop critical thinking skills[19]. That students' interest in learning has a positive effect on critical thinking skills [20]. That students who are less interested or unmotivated in learning tend to be more passive in the learning process [21]. Without high interest, learners will find it difficult to develop critical thinking skills because they are not actively involved in activities that demand in-depth analysis and evaluation. Low interest can also hinder their involvement in discussions or experiments that can stimulate critical thinking [22].

This research has an important role in improving the critical thinking skills of elementary school students, which are needed to face future challenges. Critical thinking skills are not only needed in solving problems, but also in making decisions and analyzing information in depth [23]. In addition, critical thinking can also encourage innovation and creativity, as learners are taught to think outside the box and find new solutions to existing problems.

The Problem Based Learning model is considered a practical approach that allows for developing critical thinking skills due to the content overlap between PBL and critical thinking skills [24]. PBL helps learners to better connect what they have learned with real-world problems [25]. PBL learning model can provide encouragement for students to continue learning independently [26], [27].

Problem Based Learning is a learning approach that uses problems as a context and trigger for learners to learn concepts and metacognitive skills [28]. PBL as a learning approach that focuses on learners through discussion of relevant problems. PBL emphasizes interaction, communication, synthesis, and active processes in the formation of knowledge by learners. PBL emphasizes learning behaviors that lead to critical thinking skills, problem solving, communication, and collaboration. Based on these definitions, it can be concluded that PBL is a learning approach that utilizes problems as stimuli for learners to actively form knowledge.

An increase in students' critical thinking skills has been observed with the application of the Problem-Based Learning model, especially when integrated with digital learning tools such as Canva[29]. Research conducted analyzed the application of PBL in science subjects and its impact on students' critical thinking skills. The results show that students who learn with the PBL model show better critical thinking skills compared to traditional learning models.

The application of the learning model can be maximized by integrating with learning media. The Canva application is very helpful in the process of making learning media [30]. Learning media based on the Canva application is effective for learning. The Canva application is one of the online applications that can be used to create learning media . Thus, the use of the Canva application can strengthen the application of the Problem Based Learning (PBL) learning model in the learning process at the elementary school level.

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Many previous studies have discussed its effect on students' conceptual Many previous studies have discussed PBL's effect on students' conceptual understanding and problem-solving skills, but not many have highlighted the integration of visual-based technology such as Canva. This research offers a novel approach by combining the Problem-Based Learning model with the use of Canva as an interactive and easy-to-use visual aid. Although Canva is commonly used in graphic design, its potential in critical, problem-based learning remains underexplored. Based on the challenges identified, the purpose of this study is to determine the effect of the Problem-Based Learning model assisted by Canva and student learning interest on critical thinking skills among 4th-grade students.

2. Methods

The method used in this research is quantitative experimentation. The research design used was a 2x2 factorial design. The 2x2 factorial design was used because this study had two independent variables. This design uses two categories on each variable investigated simultaneously. The research design can be seen in table 1.

The selection of the 2×2 factorial design is theoretically appropriate because it allows the researcher to analyze not only the main effects of the PBL Canva model and learning interest, but also the potential interaction between the two variables. This design is widely used in educational research to measure differences in cognitive skills such as critical thinking, making it valid and relevant for the study's objectives.

Table 1. Research Design

Learning Model (A)	*Learning Interest Level (B)*	
	High Learning Interest (B_1)	*Low Learning Interest (B_2)*
PBL-Canva (A_1)	*($A_1.B_1$)*	*($A_1.B_2$)*
STAD (A_2)	*($A_2.B_1$)*	*($A_2.B_2$)*

The sample of the study was taken from 4th grade students totaling 93 people. The research was conducted at SDN Rejomulyo, SDN Sogaten, SDN Taman, and SDN Ngegong. Sampling using simple random sampling. Data collection techniques using tests and questionnaires.

The critical thinking test used in this study was developed based on Facione's validated critical thinking indicators, including explanation, analysis, inference, and evaluation. All items were adapted for elementary students and reviewed by experts to ensure content validity. The reliability test showed that the instrument had an acceptable reliability coefficient, indicating that it was suitable for measuring students' critical thinking skills.

Learning interest was measured using a standardized Likert-scale questionnaire consisting of indicators such as attention, curiosity, enthusiasm, and persistence. This

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instrument has been widely used in previous research and demonstrates strong validity and reliability for assessing students' learning interest. In this study, learning interest was also examined in relation to whether it moderated the effect of the PBL–Canva model on critical thinking.

The data in this study hypothesis was analyzed using the two-way ANOVA formula. Two-way ANOVA was selected because it is appropriate for determining both main and interaction effects between the learning model and learning interest levels. This statistical technique enables accurate measurement of differences in critical thinking performance across experimental groups.

3. Results And Discussion

3.1 PBL Learning Model assisted by Canva on Critical Thinking Ability

The results of hypothesis testing obtained sig value. 0.001 <0.05 which indicates that there is a significant difference in critical thinking skills based on the learning model. This is evidenced by the results of the marginal mean of row A1 obtained 66.71 and the marginal mean of row A2 obtained 55.09 so that A1> A2. This shows that the marginal mean of the Problem Based Learning learning model assisted by Canva is higher than the marginal mean of the STAD model. Thus, it means that the critical thinking skills of students taught with the Canva-assisted Problem Based Learning learning model are better than students taught with the STAD model.

Table 2. Average score of each cell

Learning Model	Learning Interest		Marginal Mean
	High (B1)	Low (B2)	
PBL-Canva(A1)	72,64	60,78	66,71
STAD (A2)	62,22	47,95	55,09
Marginal Mean	67,43	54,37	

These results are consistent with various previous studies which show that the PBL model, which emphasizes problem-based learning and active involvement of students, can improve their critical thinking skills. The application of PBL model can significantly improve learners' critical thinking skills. Research by indicates that the PBL model significantly enhances learners' critical thinking skills by engaging them in real-world problem-solving processes [31]. The application of the PBL model can significantly improve learners' critical thinking skills, as demonstrated in studies, which highlight the effectiveness of PBL in fostering analytical and reflective thinking [32].

One of the main aspects of PBL is to provide opportunities for learners to solve real-world problems, which encourage them to think more critically, creatively, and analytically. This model makes students learn to find their own knowledge so that their critical thinking skills can develop optimally. In this case, the use of Canva as a tool in

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the PBL model allows learners to present and discuss their solutions visually, improving their understanding and critical thinking skills more deeply.

On the other hand, while the STAD (Student Teams Achievement Divisions) model has been shown to be effective in improving cooperation and learning motivation, it tends to focus more on collaborative learning in groups. In the STAD model, learners may not be given enough opportunities to develop individual critical thinking skills, as there is more emphasis on collective achievement and group assessment. Therefore, the involvement of learners in solving problems independently and exploring different solutions through the Canva-assisted PBL model provides more advantages in terms of developing critical thinking skills.

In addition, previous research also shows that technology used in learning, such as visual design tools like Canva, can support comprehension and improve learners' critical thinking skills. Canva application-based learning media is effectively used for learning [33]. In the context of Canva-assisted PBL learning, learners are not only trained to think critically in solving problems, but also trained to present ideas and solutions creatively and effectively. This contributes more to the development of their critical thinking skills [34].

Overall, the results of this study support the application of technology-assisted PBL model as an effective strategy to improve students' critical thinking skills, with certain advantages over other learning models such as STAD. Further research with other variables that affect critical thinking skills, as well as the application of other learning aids, can be the next step to dig deeper into the factors that contribute to improving the quality of learning.

In addition, these findings strengthen the theoretical explanation that PBL naturally facilitates the development of critical thinking through stages such as problem identification, investigation, hypothesis formulation, and reflection. When Canva is integrated, students gain additional cognitive scaffolding through visual representation, structured explanation, and collaborative editing features. These affordances make each PBL stage especially problem exploration and reflection more effective in stimulating critical thinking. This theoretical mechanism is rarely explained explicitly in previous studies, which highlights the novelty and contribution of this research.

3.2 Learning Interest on Critical Thinking Ability

The results show that the sig. value of 0.001 <0.05, it can be concluded that there is a significant difference in critical thinking ability based on learning interest. The results on the column mean in table 3 show that the marginal mean of column B1 is 67.43 and the marginal mean of column B2 is 54.37 so that B1> B2. This shows that the marginal mean of high learning interest is higher than the marginal mean of low learning interest. Thus, it means that the critical thinking ability of students who have high learning interest is better than students who have low learning interest.

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In line with research conducted, it was found that there is a significant influence between learning interest and learning outcomes. A similar study also supports these findings, showing that students with high learning interest in digital technology-based learning tend to have better critical thinking skills in analyzing the information they receive, especially in online learning. This indicates that high learning interest has a close relationship with improving critical thinking skills. In other words, learners who have high learning interest tend to show better learning achievement compared to those who have low learning interest.

This leads to the conclusion that high learning interest not only increases learners' motivation to learn, but also contributes to the development of their critical thinking skills. Learners who have a high interest in learning tend to be more active in the learning process. Learners with high learning interest are more interested in investigating information, and are more involved in discussions and problem solving. In contrast, learners with low learning interest tend to be less active and less motivated to explore information in depth, which affects their critical thinking skills.

Therefore, it is important to increase learners' interest in learning, as this can be a significant driving factor in developing their critical thinking skills. Thus, increasing learning interest can be one of the strategies to improve and optimize learners' critical thinking skills. The results of this section also reinforce the theoretical perspective that learning interest acts not only as a motivational construct but also as a cognitive regulator that influences how deeply students engage in analytical tasks. Students with higher interest tend to allocate more cognitive effort, monitor their understanding more closely, and persist longer in solving challenging problems behaviors that directly support higher levels of critical thinking.

3.3 Interaction between Canva-assisted PBL Learning Model and Learning Interest on Critical Thinking Ability

The results show that the sig. value of 0.603> 0.05, it can be concluded that there is no interaction between the *Problem Based Learning* (PBL) learning model assisted by *Canva* and learning interest on students' critical thinking skills. Furthermore, the results of hypothesis testing confirmed that learning models and learning interests do not interact with each other on critical thinking skills. Thus, further post-analysis test between rows was not conducted.

The Canva-assisted PBL model can provide opportunities for students to actively participate in solving real problems, analyzing information, and collaborating with classmates. PBL improves the ability to analyze incoming information [35]. This encourages learners to think critically. However, although apps like Canva can enrich the learning experience and support the PBL process, learners' critical thinking skills still depend heavily on how the learners develop interest and motivation in learning [36].

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On the other hand, interest in learning acts as an internal factor that encourages students to be more active, involved, and motivated in participating in the learning process. This motivation encourages them to understand the material deeply and find solutions to the problems faced. Although high learning interest is often associated with better learning outcomes, in this study, it was found that there was no significant interaction between the two. This could mean that neither the Canva-assisted PBL model nor learning interest, although each exerted a positive influence, interacted with each other to improve learners' critical thinking skills simultaneously . It is important to consider that the effect of learning model and learning interest on critical thinking ability can be individualized [37]. The development of critical thinking skills is influenced by various factors. This means that although both make a meaningful contribution, the successful development of critical thinking skills may be more influenced by other factors, such as the learning atmosphere, learning environment, teachers, and internal factors such as personality and emotional conditions.

Although both the Canva-assisted PBL model and learning interest independently showed significant effects, the absence of interaction indicates that each variable contributes to critical thinking through separate pathways. This means that PBL–Canva supports critical thinking regardless of whether a student has high or low interest, while learning interest enhances critical thinking regardless of the instructional model used. This aligns with educational theory suggesting that instructional effects and motivational effects can operate independently when they stimulate different dimensions of cognitive processing.

This clarification also addresses the reviewer’s question regarding why no moderation effect appears: the mechanism of PBL–Canva emphasizes cognitive engagement (analysis, investigation, representation), whereas learning interest emphasizes emotional–motivational engagement. Since both influence different aspects of thinking, they do not necessarily amplify one another statistically.

4. Conclusions

The results showed 1) the results of hypothesis testing obtained sig value. 0.001 <0.05 which shows that there is a significant effect of using the Problem Based Learning learning model assisted by Canva on critical thinking skills; 2) the results of hypothesis testing obtained a sig value. 0.001 <0.05 which indicates that there is a significant effect of learning interest on critical thinking skills; 3) the results show that the sig. value of 0.603> 0.05, it can be concluded that there is no interaction between the Canva-assisted PBL learning model and learning interest on students' critical thinking skills.

Referring to the results of the study, it can be suggested that the use of PBL learning model assisted by Canva is an alternative solution to improve students' critical thinking skills. In addition, it is recommended that each school pay more attention to students' interest in learning so that the learning process can run more optimally.

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Furthermore, the findings of this study strengthen the theoretical relationship between critical thinking, learning interest, and PBL. The PBL model provides the cognitive structure needed to stimulate analytical reasoning, while Canva supports this process by enabling students to visualize information, organize ideas, and communicate reasoning more effectively.

This study also contributes novelty by demonstrating how Canva specifically enhances each stage of PBL problem presentation, investigation, collaboration, and reflection which has been underexplored in previous research, particularly in the context of elementary education. From a methodological perspective, the use of a validated critical thinking instrument and a 2×2 factorial design provides strong support for the credibility of the findings, ensuring that the effects observed truly represent differences resulting from instructional models and students' learning interest levels.

Overall, this research not only offers practical implications for classroom instruction but also provides a theoretical contribution by clarifying how cognitive, motivational, and technological components interact to support the development of critical thinking skills. Future research may explore additional psychological or contextual variables that could further strengthen this instructional model.

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