

THE DEVELOPMENT OF CANVA-ASSISTED PROBLEM BASED LEARNING MEDIA TO IMPROVE STUDENTS' CRITICAL THINKING SKILLS AND DIGITAL LITERACY ON ELEMENTARY SCHOOL

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ABSTRACT

The mathematical critical thinking skills and digital literacy of elementary school students are still not optimally developed, while the demands of 21st century learning require the mastery of these two competencies in an integrated manner. This research aims to develop a *Problem Based Learning* learning model with interactive Canva media to improve the mathematical critical thinking and digital literacy skills of grade V elementary school students. This research uses a *Research and Development* (R&D) approach with the Borg and Gall model which is modified into seven stages, namely preliminary research, planning, product development, expert validation, revision, field trials, and product refinement. The research subjects consisted of 60 grade V students at SD Al-Ikhlas and SD Cemara who were selected through *purposive sampling techniques*. The research instruments include expert validation sheets, critical thinking ability tests (*pretest-posttest*), digital literacy observation sheets, and student response questionnaires. Data analysis used descriptive statistics as well as the nonparametric tests of the *Wilcoxon Signed-Rank Test* and *Mann-Whitney* because the data were not entirely distributed normally based on the Shapiro-Wilk test. The results of expert validation showed that the model obtained a very decent category with an average score of 4.510 out of a scale of 5.0. Mathematical critical thinking skills increased significantly from an average of 47.90 pretest to a posttest of 77.58 with an N-gain value of 0.567 in the medium category and a significance of 0.000. Students' digital literacy reached an average of 16.87 from a maximum score of 20, while student responses showed a positive category with an average of 4.187 out of a scale of 5.0. The *Problem Based Learning* model with interactive Canva media has proven to be feasible, effective, and practical as an innovative learning alternative based on the *Technological Pedagogical Content Knowledge framework* to improve the mathematical critical thinking skills and digital literacy of elementary school students.

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INTRODUCTION

21st century education demands a paradigm shift in learning that focuses not only on the mastery of knowledge, but also on the development of critical thinking skills (Djuariah & Hendra, 2023). Technological developments and global dynamics encourage schools to equip students with competencies known as 21st century skills, such as critical thinking, creativity, communication, and collaboration (Mashudi, 2021). Critical thinking skills are one of the main competencies because they help students analyze information rationally and make evidence-based decisions (Astuti, 2024). In addition, the changing educational landscape due to digital advances demands more adaptive and innovative learning so that students are able to face the complexities of modern life (Subro & Fawaid, 2025). These changes suggest that learning needs to be designed to train deeper cognitive abilities from the primary education level.

Along with the accelerating digital transformation, digital literacy is an important competency that students must have as part of 21st century skills (Megawati & Sofiroh, 2025). Digital literacy is not only related to the ability to use technology, but also includes the ability to understand, evaluate, and use information critically in a digital environment (Rany et al., 2025). Digital literacy is closely related to critical thinking skills because students need to assess the validity of information in the midst of massive information flows (Fatmawati, 2025). In mathematics learning, critical thinking skills play an important role in the reasoning and problem-solving process so as to support the strengthening of students' cognitive competence (Zamista & Charona, 2023). Therefore, the integration of critical thinking skills and digital literacy is a major need in today's learning design.

The mathematical critical thinking skills of elementary school students are still not optimally developed because learning tends to focus on problem-solving procedures and mastery of formulas (Prajamukti, 2025). Learning activities emphasize more on routine practice than exploration of contextual problems that demand analysis and reasoning. This condition causes students to be less accustomed to identifying important information, evaluating strategies, and drawing logical conclusions in solving math problems (Apriyanti et al., 2024). In fact, strengthening high-level thinking skills from the elementary level is very necessary to support students' readiness to face the demands of 21st century learning (Sutika et al., 2022). Learning models that do not leave room for *Problem solving* Actively tends to hinder the development of students' critical thinking skills (Wiratama et al., 2025).

This condition is in line with the initial findings of the study which showed that the average value of *Pretest* Students' mathematical critical thinking skills were at 47.9 before the intervention was carried out, which indicates the need to improve learning design. In addition, the use of technology in mathematics learning is still limited to the passive use of devices, so it has not directly trained students' digital literacy in an academic context. Digital literacy should not only be understood as the ability to use devices, but also the ability to process, evaluate, and produce digital information appropriately in the learning process (Jusrianto et al., 2025). Undirected technology integration has the potential to deprive learners of the opportunity to develop critical thinking skills and digital literacy simultaneously (Handayani et al., 2025).

Models *Problem Based Learning* (PBL) is widely used as a learning approach that encourages high-level thinking activities through the presentation of contextual problems that demand active analysis and problem-solving. This approach provides students with the opportunity to construct knowledge through an investigative process so that they can strengthen mathematical critical thinking skills compared to conventional learning (Lu et al., 2025). *Problem Based Learning* It is also able to increase student engagement because the learning process is centered on exploration activities that are relevant to the student's real experience (Hasibuan et al., 2024).

In addition to the learning model, the use of interactive digital media is a strategy that has begun to be used to support the quality of learning in the 21st century. Technology integration through the framework *Technological Pedagogical Content Knowledge* (TPACK) enables teachers to effectively combine pedagogical aspects, content, and technology in mathematics learning (Leba et al., 2024). Visual design-based media such as Canva is considered to have potential because it is easily accessible and able to support students' creative activities in presenting information visually. However, the use of technology in learning often focuses only on media without integrating it with learning models that specifically train critical thinking and digital literacy simultaneously (Wulandari et al., 2025).

Research related to Models *Problem Based Learning* (PBL) has been done by many experts. For example, research Lu et al. (2025) using PBL as a learning approach that is able to improve critical thinking skills through contextual problem-solving activities that demand active analysis, reasoning, and decision-making. In mathematics learning, this approach provides an opportunity for students to build a more in-depth conceptual understanding than procedure-oriented learning. In addition, the findings of the study Hasibuan et al. (2024) also showed that the application of PBL had a significant influence on the improvement of higher-level thinking skills and mathematical problem-solving abilities. Then, the research Harahap & Amin (2025) demonstrate the integration of technology through the framework *Technological Pedagogical Content Knowledge* (TPACK) is one of the strategies that supports the development of students' digital literacy while increasing the effectiveness of technology-based learning.

Then the research Squirting (2026) shows the use of interactive digital media such as Canva is starting to be used in learning because it has visual design features that are easily accessible and able to increase student engagement and creativity in the technology-based learning process. However, most of the research still focuses on learning models or digital media separately so that the integration of the two has not been carried out optimally, especially in the context of mathematics learning in elementary schools. The development of a learning model that simultaneously combines the PBL approach with interactive Canva media to improve students' mathematical critical thinking and digital literacy skills is still limited. Therefore, this research offers a novelty in the form of the development of an integrated learning model designed to strengthen both competencies simultaneously in one systematic learning design.

Based on these various explanations, this study aims to develop a *Problem Based Learning learning model* with interactive Canva media to improve the mathematical critical thinking and digital literacy skills of grade V elementary school students. In particular, this study aims to test the feasibility of learning models developed based on the assessment of material experts, media experts, and educational practitioners. In addition, this study also aims to measure the effectiveness of the model in improving students' mathematical critical thinking skills through the analysis of pretest and posttest score improvements. This study also analyzes students' digital literacy achievements in using interactive learning technology and identifies students' responses to the application of learning models based on the *Technological Pedagogical Content Knowledge* framework to ensure the practicality of models in mathematics learning in elementary schools.

METHOD

This research uses a *Research and Development* (R&D) approach that aims to produce a product in the form of a *Problem Based Learning* learning model with interactive Canva media that is feasible, effective, and practical (Sugiyono, 2019). The development model used is the Borg and Gall model which is modified into seven stages, namely: (1) preliminary research, (2) planning, (3) product development, (4) expert validation, (5) revision, (6) field trials, and (7)

product refinement (Borg & Gall, 1983). The stages of learning model development in this study are described as follows:



Figure 1. Borg and Gall Model R&D Research Stages

At the preliminary research stage, a needs analysis was carried out through observation and interviews with grade V mathematics teachers to identify the initial conditions of critical thinking skills and the use of technology in learning (Sukmadinata, 2015). The results of the analysis became the basis for designing the PBL model with interactive Canva media that integrates the *Technological Pedagogical Content Knowledge* (TPACK) framework. After the product was developed, it was validated by four validators consisting of two expert lecturers and two elementary mathematics teachers using a Likert scale of 1 to 5. Based on validator input, the product is revised before being tested in the field.

The research subjects consisted of 60 grade V students at SD Al-Ikhlas and SD Cemara who were selected using *purposive sampling techniques* (Creswell, 2014). The trial was carried out in two stages, namely a limited trial (15 students at SD Al-Ikhlas) and a broad trial (45 students from both schools). The research instruments include expert validation sheets, critical thinking ability tests (*pretest-posttest*), digital literacy observation sheets, and student response questionnaires.

Data analysis used descriptive statistics as well as nonparametric tests because the data were not entirely normally distributed based on the Shapiro-Wilk test. The *Wilcoxon Signed-Rank Test* is used to compare *pretest* and *posttest* scores, while the *Mann-Whitney* test is used to compare N-Gain and digital literacy between schools (Sugiyono, 2019). The increase in critical thinking skills was analyzed using the N-Gain formula (Hake, 1999) with the criteria: high ($g \geq 0.70$), medium ($0.30 \leq g < 0.70$), and low ($g < 0.30$). The feasibility criteria of the model refer to Riduwan (2015) as presented in the following table:

Table 1. Learning Model Eligibility Criteria

Average Score	Categories
4,21 – 5,00	Highly Worth It
3,41 – 4,20	Worthy
2,61 – 3,40	Quite Decent
1,81 – 2,60	Less Worthy
1,00 – 1,80	Not Eligible

RESULTS AND DISCUSSION

Results

PBL Model Eligibility with Canva Interactive Media

The Problem Based Learning *learning model* with interactive Canva media was validated by four validators, consisting of two expert lecturers and two elementary math teachers, to ensure feasibility prior to implementation. The assessment includes material suitability, media design, language and instruction, PBL syntax, and implementation using a scale of one to five. The validation results showed a very positive response and the model was declared suitable for use in elementary school mathematics learning.

Table 2. Expert Validation of PBL Models with Canva Interactive Media

Assessment Aspects	Lecturer Material Expert	Media Expert Lecturer	Mat 1 Teacher	Mat 2 Teacher	Average
Material Suitability	4,2	4,0	4,8	4,1	4,275
Media Design	4,8	4,3	4,3	4,5	4,475
Language of Instruction	4,5	4,0	4,1	4,1	4,175
PBL syntax	4,8	4,9	4,9	4,8	4,850
Implementation	4,5	4,9	4,9	4,8	4,775
Total Average	4,56	4,42	4,60	4,46	4,510

The validation results showed an average score of 4.510 out of 5.0 (90.2%) so that the learning model was categorized as very feasible. The highest score was found in *the Problem Based Learning syntax* (4,850), followed by implementation (4,775) and media design (4,475). The material and language aspects are also very feasible although it is recommended to simplify instructions and adjust the difficulty level as a basis for revision before the field trial.

Table 3. Distribution of Learning Model Eligibility Categories

Categories	Number of Validators	%rate %
Highly Worth It	2	50,0%
Worthy	2	50,0%
Quite Decent	0	0%
Less Worthy	0	0%
Not Eligible	0	0%
Total	4	100%

Two validators rated the model as very feasible and the other two were feasible, without negative assessments, showing consistency despite different backgrounds. A low standard deviation (0.084) signals a strong deal. *The Problem Based Learning* model with interactive Canva media meets the criteria for material, media design, language, syntax, and implementation, so it is declared feasible for grade V math learning and ready for field testing.

The Effectiveness of *the Problem Based Learning* Model with Canva Interactive Media on Students' Mathematical Critical Thinking Skills

The effectiveness of *the Problem Based Learning* model with interactive Canva media was analyzed in grade V students of SD Al-Ikhlâs and SD Cemara through systematic stages. The analysis includes descriptive statistics to describe the distribution of pretest, *posttest*, and N-Gain data, normality tests as the basis for method selection, and nonparametric inferential tests

to ascertain the significance of empirically and statistically improving students' mathematical critical thinking skills.

Table 4. Descriptive Statistics of Mathematical Critical Thinking Skills of Students of SD Al-Ikhlhas and SD Cemara

Variable	N	Minimum	Maximum	Red	Std. Deviation
<i>Pretest</i>	60	29	65	47.90	10.626
<i>Posttest</i>	60	58	89	77.58	8.005
N-Gain	60	0.229	0.821	0.567	0.125

Based on the table presented, the average *Pretest* score of students at SD Al-Ikhlhas and SD Cemara of 47.90 shows the initial ability to think critically at a moderate level with high variation. After the implementation of the *Problem Based Learning* model with Canva media, the average *posttest* increased to 77.58 with a lower standard deviation, indicating an improvement and homogeneity of ability. The value of N-Gain 0.567 belongs to the medium category. The Shapiro-Wilk normality test is performed before the inferential analysis at the limited and extensive test stage.

Table 5. Shapiro-Wilk Normality Test Results of Mathematical Critical Thinking Ability

Test Stage	School	Variable	N	Sig.	Remarks
Limited Test	Al-Ikhlhas Elementary School	<i>Pretest</i>	15	0.225	Normal
Limited Test	Al-Ikhlhas Elementary School	<i>Posttest</i>	15	0.269	Normal
Test Scope	SD Al-Ikhlhas & SD Cemara	<i>Pretest</i>	45	0.021	Abnormal
Test Scope	SD Al-Ikhlhas & SD Cemara	<i>Posttest</i>	45	0.002	Abnormal

The results of the normality test showed that the *pretest* and *posttest* data in the limited test at SD Al-Ikhlhas were distributed normally, while the area test was abnormal because the significance value was below 0.05. Therefore, a nonparametric test, namely the Wilcoxon Signed-Rank Test to compare pre-test and Mann-Whitney to compare N-Gain between schools in assessing the effectiveness of the learning model, was used.

Table 6. Summary of Wilcoxon Signed-Rank Test Results

Test Stage	School	N	Z	Sig.	Conclusion
Total Sample	SD Al-Ikhlhas & SD Cemara	60	-6.745	0.000	Significant
Limited Test	Al-Ikhlhas Elementary School	15	-3.441	0.001	Significant
Test Scope	SD Al-Ikhlhas & SD Cemara	45	-5.845	0.000	Significant

The results of the Wilcoxon test showed a significance value of <0.05 across all tests, indicating a significant difference between *pretest* and *posttest* scores and an increase in students' mathematical critical thinking skills. Improvements occurred consistently in both limited and extensive trials in the two schools, demonstrating the effectiveness of the model. The comparison of effectiveness between schools was analyzed using the N-Gain value through the Mann-Whitney test because the data were abnormal.

Table 7. Mann-Whitney Test Results Comparison of N-Gain in SD Al-Ikhlhas and SD Cemara

Variable	School	U	Z	Sig.	Conclusion
N-Gain	Al-Ikhlhas Elementary School vs Cemara Elementary School	342.000	-1.597	0.110	Insignificant

The significance value of 0.110 (>0.05) showed that there was no significant difference in the improvement of mathematical critical thinking skills between students of Al-Ikhlhas Elementary School and Cemara Elementary School. This indicates that the effectiveness of the *Problem*

Based Learning model with interactive Canva media is relatively consistent across the two school contexts. The N-Gain analysis was then performed to see the level of improvement based on the comparison of pretest and *posttest* scores to the ideal maximum score.

Table 8. Distribution of N-Gain Category of Mathematical Critical Thinking Skills of Elementary School Students of Al-Ikhlas and Cemara Elementary School

N-Gain Category	Value Range	Number of Students	%rate (%)
Height	$g \geq 0.70$	8	13,3%
Medium	$0.30 \leq g < 0.70$	52	86,7%
Low	$g < 0.30$	0	0%
Total		60	100%

The majority of students at SD Al-Ikhlas and SD Cemara were in the medium improvement category (86.7%), while 13.3% reached the high category, without the low category. This shows that all students experience an increase in mathematical critical thinking skills after the application of the model. The findings reinforce that *the Problem Based Learning model* with interactive Canva media is effective in consistently improving students' abilities in both schools.

The Effectiveness of the Problem Based Learning Model with Canva Interactive Media in Improving Students' Digital Literacy

Students' digital literacy was measured through observation of the use of interactive Canva during learning in 60 students from two schools. Assessments include Canva skills, digital collaboration, visual creativity, and understanding of digital tools on a scale of 1–5. The data was analyzed using descriptive statistics to determine the level of technology mastery, with low to very high achievement categories based on students' total digital literacy scores.

Table 9. Descriptive Statistics of Students' Digital Literacy

Indicator	N	Minimum	Maximum	Red	Std. Deviation
Canva Capabilities	60	3	5	4.22	0.846
Digital Collaboration	60	3	5	4.28	0.715
Visual Creativity	60	3	5	4.22	0.783
Understanding Tools	60	3	5	4.15	0.755
Total Score	60	13	20	16.87	1.751

The average digital literacy score of students reached 16.87 out of 20 with low variation. The highest indicator is digital collaboration, followed by Canva's capabilities and visual creativity, as well as understanding tools. The results show that students are able to use Canva technically and creatively. A comparative analysis was carried out to see the difference in digital literacy between SD Al-Ikhlas and SD Cemara and ensure the consistency of the effectiveness of the learning model.

Table 10. Comparison of Average Digital Literacy of Students Between Schools

School	N	Red	Std. Deviation
Al-Ikhlas Elementary School	30	16.97	2.092
Elementary School Cemara	30	16.77	1.357
Total	60	16.87	1.751

Based on the table above, the average digital literacy score of students at SD Al-Ikhlas of 16.97 is slightly higher than SD Cemara which reached 16.77. The average difference between the two schools was only 0.20 points, which shows that digital literacy achievement in both schools is relatively equal. The standard deviation at SD Cemara was lower (1,357) than at SD Al-Ikhlas (2,092), indicating that the achievement of digital literacy of students at SD Cemara was

more homogeneous. Before conducting a difference test, it is necessary to conduct a data normality test to determine the right type of statistical test.

Table 11. Results of Digital Literacy Normality Test for Each School

School	Shapiro-Wilk Statistic	df	Sig.
Al-Ikhlâs Elementary School	0.932	30	0.054
Elementary School Cemara	0.920	30	0.027

The results of the normality test using Shapiro-Wilk showed that the digital literacy data at SD Al-Ikhlâs had a significance value of 0.054 which was greater than 0.05 so that it could be declared to be normally distributed. However, digital literacy data at SD Cemara has a significance value of 0.027 which is smaller than 0.05 so it is not distributed normally. Because one of the data groups did not meet the normality assumption, the difference test was performed using the non-parametric Mann-Whitney U test as an alternative to the independent sample t-test.

Table 12. Results of the Mann-Whitney Test Comparing Digital Literacy Between Schools

Test	Mann-Whitney U	Asymptotic Sig. (2-tailed)	Verdict
Total_Skor	429.500	0.758	Retain the null hypothesis

The Mann-Whitney test showed a significance value of 0.758 (>0.05), so there was no significant difference in digital literacy between students of SD Al-Ikhlâs and SD Cemara. Although the average of SD Al-Ikhlâs is slightly higher, the results are relatively equal. This shows that *the Problem Based Learning* model with Canva media is effective and consistent. The analysis of the digital literacy category was carried out to see the distribution of student achievement in more detail.

Table 13. Distribution of Student Digital Literacy Categories by School

Categories	Al-Ikhlâs		Elementary		Total	
	Elementary School	%	School Cemara	%	Quantity	%
	Quantity		Quantity			
Very High	13	43.3%	9	30.0%	22	36.7%
Height	14	46.7%	19	63.3%	33	55.0%
Medium	3	10.0%	2	6.7%	5	8.3%
Low	0	0.0%	0	0.0%	0	0.0%
Total	30	100%	30	100%	60	100%

The majority of students achieved high (55%) and very high (36.7%) digital literacy categories, with only 8.3% in the medium category and no low category. These results show that 91.7% of students have good digital literacy after learning. The findings confirm the effectiveness of the *Problem Based Learning* model with Canva media. Analysis per indicator was conducted to identify strengths, weaknesses, and consistency of achievement between schools.

Table 14. Average Achievement Per Digital Literacy Indicator By School

Indicator	Al-Ikhlâs Elementary School	Elementary School Cemara	Total
	Red (SD)	Red (SD)	Red (SD)
Canva Capabilities	4.23 (0.898)	4.20 (0.805)	4.22 (0.846)
Digital Collaboration	4.33 (0.758)	4.23 (0.679)	4.28 (0.715)
Visual Creativity	4.17 (0.834)	4.27 (0.740)	4.22 (0.783)
Understanding Tools	4.23 (0.858)	4.07 (0.640)	4.15 (0.755)

The digital collaboration indicator obtained the highest average (4.28), followed by Canva's capabilities and visual creativity (4.22), while the lowest tool understanding (4.15) remained high. SD Al-Ikhlās excels in collaboration and understanding tools, while SD Cemara excels in visual creativity, with a small difference. The results show that *the Problem Based Learning* model with Canva media is effective in developing digital literacy comprehensively, although the understanding of tools still needs to be improved.

Student Response to *the Problem Based Learning* Model with Canva Interactive Media

Students' responses to the application of *the Problem Based Learning* model with interactive Canva media were measured to assess the level of practicality of learning. Measurements were conducted through questionnaires that included learning interests, material understanding, benefits of Canva, collaboration, and motivation. Data from 60 students were analyzed using the Likert scale to describe students' perceptions descriptively of the effectiveness of the applied learning model.

Table 15. Descriptive Statistics of Student Responses

Indicator	N	Minimum	Maximum	Red	Std. Deviation
Learning_Interest	60	3	5	4.27	0.778
Understanding_Concept	60	3	5	4.23	0.810
Canva_Benefit	60	3	5	4.30	0.696
Collaboration	60	3	5	4.18	0.770
Motivation	60	3	5	3.95	0.852
Average	60	3.4	4.8	4.187	0.4115

Based on the table above, the average student response of 4,187 on a scale of 5 shows positive acceptance of *the Problem Based Learning* model with interactive Canva media. Canva's benefits are the highest scores, followed by interest in learning and understanding of the material which shows increased student engagement and understanding, while learning motivation is lowest but still positive. To ensure consistency of implementation in different contexts, a descriptive analysis and comparison of responses between schools were conducted.

Table 16. Comparison of Average Student Responses Between Schools

School	N	Red	Std. Deviation
Al-Ikhlās Elementary School	30	4.080	0.4972
Elementary School Cemara	30	4.293	0.2716
Total	60	4.187	0.4115

Based on the table above, the average student response at SD Cemara was 4,293 higher than SD Al-Ikhlās which reached 4,080. The average difference of 0.213 points showed that students at SD Cemara responded more positively to the learning model. The standard deviation at SD Cemara was lower (0.2716) than at SD Al-Ikhlās (0.4972), indicating that the response of students at SD Cemara was more consistent and homogeneous. Before conducting a difference test, it is necessary to conduct a data normality test to determine the right type of statistical test.

Table 17. Results of Normality Test of Student Responses by School

School	Shapiro-Wilk Statistic	df	Sig.
Al-Ikhlās Elementary School	0.861	30	0.001
Elementary School Cemara	0.932	30	0.057

The results of the normality test using Shapiro-Wilk showed that the student response data at SD Al-Ikhlhas had a significance value of 0.001 which was smaller than 0.05 so that it was not distributed normally. The student response data at SD Cemara has a significance value of 0.057 which is greater than 0.05 so that it can be declared to be normally distributed. Because one of the data groups did not meet the normality assumption, the difference test was performed using the non-parametric Mann-Whitney U test as an alternative to the independent sample t-test.

Table 18. Results of the Mann-Whitney Test Comparing Student Responses Between Schools

Test	Mann-Whitney U	Asymptotic Sig. (2-tailed)	Verdict
Average	588.000	0.039	Reject the null hypothesis

Based on the results of the Mann-Whitney test in the table above, the significance value is 0.039 (<0.05), so there is a difference in student responses between SD Al-Ikhlhas and SD Cemara, with a more positive response at SD Cemara. This difference is influenced by student characteristics, teacher experience, or learning facilities. However, both schools still showed a positive response. Category distribution analysis was carried out to see the distribution of student acceptance rates in more detail.

Table 19. Distribution of Student Response Categories by School

Categories	Number of Al-Ikhlhas Elementary School	Presented %	Number of Elementary Schools Cemara	Presented %	Total	
Very Positive	9	30.0%	7	23.3%	16	26.7%
Positive	19	63.3%	23	76.7%	42	70.0%
Enough	2	6.7%	0	0.0%	2	3.3%
Negatives	0	0.0%	0	0.0%	0	0.0%
Very Negative	0	0.0%	0	0.0%	0	0.0%
Total	30	100%	30	100%	60	100%

Based on the table above, the majority of students (70%) responded positively and 26.7% were very positive towards the *Problem Based Learning* model with Canva, with no negative responses. Cemara Elementary School showed a consistent positive response, while Al-Ikhlhas Elementary School was more varied. These findings confirm the practicality of the learning model. Analysis per indicator was conducted to identify strengths and aspects that need improvement based on interests, understanding, benefits of Canva, collaboration, and motivation to learn.

Table 20. Average Response Per Indicator By School

Indicator	Al-Ikhlhas Mean Elementary School (SD)	Elementary School Cemara Merah (SD)	Total Mean (SD)
Interest in Learning	4.10 (0.885)	4.43 (0.626)	4.27 (0.778)
Material Understanding	4.13 (0.900)	4.33 (0.711)	4.23 (0.810)
Benefits of Canva	4.17 (0.699)	4.43 (0.679)	4.30 (0.696)
Group Collaboration	4.07 (0.828)	4.30 (0.702)	4.18 (0.770)
Learning Motivation	3.93 (0.980)	3.97 (0.718)	3.95 (0.852)

Based on the table above, Canva's Benefits Indicator scored the highest (4.30), followed by learning interest, material understanding, and group collaboration that showed a positive

response from students to *the Problem Based Learning model*. Learning motivation is the lowest score but still positive. Cemara Elementary School has a higher average and more consistent response than Al-Ikhlas Elementary School. Overall, the model is effective even though learning motivation still needs additional reinforcement strategies.

Discussions

Expert validation results show that the *Problem Based Learning* with interactive Canva media earning a very decent category with an average score of 4,510 out of 5.0 or equivalent to 90.2%. The findings are in line with the research Rosalina and Jasiah (2025) which states that the high feasibility of the learning model reflects the compatibility between the syntax *Problem Based Learning*, math content and Canva's technology integration to support an effective learning process. These findings are in line with the findings of the study Jannah et al. (2025) which shows that the development of learner-based worksheets *Problem Based Learning* that integrates with the framework *Technological Pedagogical Content Knowledge* obtain excellent validation from experts with a PBL approach that facilitates active student engagement while the TPACK framework ensures the integration of technology, pedagogy, and content knowledge in the learning process.

The improvement of students' mathematical critical thinking skills in this study showed significant results with an average pretest score of 58.69 increasing to 82.41 in *Posttest* which produces an N-gain value of 0.58 which belongs to the medium category. These findings are in line with the findings of the study Utomo and Hardini (2023) which shows the improvement of critical thinking skills of grade IV elementary school students through the application of the model *Problem Based Learning*, where there was an increase from the first cycle of 87.62% of the good category to 91.18% of the very good category in the second cycle. The findings are also in line with the findings of the study Tampubolon et al. (2025) confirms that the *Problem Based Learning* effective in improving students' critical thinking skills based on analysis of various previous studies that show the consistency of positive results of the application of this model.

Models Problem Based Learning It theoretically facilitates the development of critical thinking skills due to its syntax that exposes students to authentic problems that require analysis, evaluation, and synthesis of information to find solutions. These findings are in line with the findings of the study Azka et al. (2025) which shows that the model *Problem Based Learning* With dynamic assessments with a differentiated learning approach that is effective in developing students' critical thinking skills with the contribution of pedagogic knowledge and content components to critical thinking skills reaching 61.0%. This is also in line with Ennis (2018) which emphasizes the importance of the ability to analyze arguments, evaluate the credibility of sources and draw logical conclusions based on the evidence available in the context of problem-solving.

The achievement of students' digital literacy in this study showed positive results with an average total score of 16.87 out of a maximum score of 20 which shows that students are able to operate Canva effectively for learning purposes. These findings are in line with the findings of the study Ridwan (2024) which shows that the use of Canva can improve students' digital literacy in learning, where the use of Belajar.id and Canva accounts in designing learning outcomes in differentiated learning can improve students' ability to use digital technology creatively. The findings are also in line with the findings of the study Ningrum et al. (2024) which confirms that the use of Canva's app-based learning media can develop the digital literacy culture of elementary school students, having a positive impact in the form of increasing interest in learning, ease of access to information, and developing students' creativity.

Canva's interactive media integration in the model *Problem Based Learning* Reflects the implementation of the framework *Technological Pedagogical Content Knowledge* which emphasizes the importance of synergy between technological knowledge, pedagogy and content in learning. These findings are in line with the findings of the study Fakhriyah et al. (2022) which indicates that the ability profile *Technological Pedagogical Content Knowledge* students who are good elementary school teachers contribute to their ability to integrate technology when becoming teachers in the future, with the influence of the components of pedagogical knowledge, content, and technology on TPACK reaching 61.0%. The findings are also in line with the findings of the study Maida et al. (2025) which shows that Canva's app-based digital literacy mentoring is able to improve students' graphic design skills demonstrated through a variety of creative products such as posters and infographics, as well as increase students' motivation to learn as seen from students' enthusiasm, active participation, and curiosity in using the app.

The positive response of students to the learning model with an average score of 4.187 out of a scale of 5.0 indicates that this model is practical and well accepted by students in the context of elementary school mathematics learning. These findings are in line with the findings of the study Sa'adah and Salimi (2025) that indicates that the application of the model *Problem Based Learning* with Liveworksheet media increased students' critical thinking skills from the first cycle by 78.62% to 82.78% in the second cycle and reached 86.95% in the third cycle which shows that the integration of technology in the PBL model has a positive effect on the learning process. The findings are also in line with the findings of the study Nurmayanti et al. (2026) that reports that the model *Problem Based Learning* with the media *Augmented Reality* effective in improving students' critical thinking skills, where the use of technology in learning is able to create a more interactive, interesting, and meaningful learning experience for students.

CONCLUSION

The development of the *Problem Based Learning model* with interactive Canva media proved to be very feasible based on expert assessment with an average score of 4.510 out of a scale of 5.0 (90.2%), effective in improving students' mathematical critical thinking skills as shown by the increase in the average score from 47.90 in the pretest to 77.58 in the posttest with an N-gain value of 0.567 in the medium category and significant Wilcoxon test results (0.000), and practical with a positive response of students who reached an average of 4.187 on a scale of 5.0. Students' digital literacy is also well developed, as shown by an average score of 16.87 out of a maximum score of 20, which indicates that the integration of the *Technological Pedagogical Content Knowledge* framework in learning design is able to develop both competencies simultaneously. For future researchers, it is recommended that similar developments be carried out at a more diverse level or subject by involving a larger sample and a broader school context, and exploring the use of digital platforms other than Canva to amplify the generalization of findings and expand the impact of technology-based learning innovations.

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