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DEVELOPMENT OF CANVA-ASSISTED PROBLEM BASED LEARNING MODEL TO IMPROVE STUDENTS' MATHEMATICAL CRITICAL THINKING ABILITIES AND COLLABORATION ON PRIMARY SCHOOL

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ABSTRACT

The purpose of this study is to determine how to develop a PBL learning model assisted by the Canva Interactive application on fraction material. This type of research uses Research and Development (R&D) using the Borg and Gall model. The sampling technique uses simple random sampling, namely 114 fifth grade students (5) in Purwakarta Regency. Data collection techniques use interviews, observations, Pre-tests and Post-tests (critical thinking skills). The data analysis test used is qualitative descriptive analysis, which describes the results of product development. The results of the research conducted on the validation test obtained an average score of 4.46 with the criteria of "suitable for use without revision" by 2 expert lecturers, 4.7 with the criteria of "suitable" by 1 expert teacher. The effectiveness trial was carried out on a large scale obtained an average percentage of independent sample test output for the Sig value (2-tailed) of 0.001 <0.05. Based on this, it can be concluded that H0 is rejected, namely there is a difference in mathematical critical thinking and collaboration abilities. Meanwhile, the improvement of students' critical thinking skills obtained an average N-Gain percentage of 41.27% with the category of "quite effective" and the percentage of N-Gain for collaboration skills obtained 63.1% with the category of "effective". The results of this study indicate that the PBL model assisted by the Interactive Canva application developed has the criteria of being feasible/valid and is quite effective to be used as a learning tool in mathematics learning on the critical thinking and collaboration skills of elementary school students.

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INTRODUCTION

Indonesia is currently undergoing the Industrial Revolution 4.0, which has ushered in an era of openness and globalization in the 21st century. This era is expected to expand job opportunities and simplify and accelerate human work, resulting in better results. The transformation of human life in this century requires high-quality human resources in all aspects of work. Rapid changes cannot be ignored because they occur in society, the environment, and daily activities. Significant changes are seen in information and digital technology, including social networks, which are now widely used regardless of social status. The latest demand calls for a breakthrough thinking process if what is desired is a quality end result that can compete with global work (Hasan et al., 2023).

Critical thinking is a persistent effort made to test something that is believed to be true or knowledge through supporting evidence so that the right conclusions can be drawn (Sari Asmawati, 2015). Critical thinking skills need to be integrated into learning as a goal of the learning process because it can provide experience to be able to compete in the future (Rachmawati & Rohaeti, 2018). Contextually, thinking can be divided into two parts: high-order thinking and low-order thinking. Mathematics learning in the 21st century emphasizes critical thinking for students so they can implement mathematical skills through their acquired knowledge. Thus, educational goals can be achieved in accordance with the graduate profile dimensions of the independent curriculum, which upholds critical thinking in students.

Collaboration skills are students' abilities to communicate dialogically with the aim of exchanging ideas, opinions, perspectives, or concepts. Through collaboration skills, students can gain knowledge and experience from others, as well as develop critical thinking and communication skills. Collaborative learning involves five essential elements: positive interdependence, face-to-face promotive interactions, individual accountability and personal responsibility, teamwork and social skills, and group processing (Sari & Mawardi, 2023).

The competencies students need to collect, manage, and utilize data to survive in an ever-changing, uncertain, and competitive era. In an ever-changing, uncertain, and competitive era, mathematics is a science that lies at the core of all scientific fields that we need to understand. Therefore, from early childhood education (PAUD) to elementary school and university, mathematics is always a compulsory subject.

In fact, the results of the 2018 Program for International Student Assessment (PISA) survey released by the OECD (Organization for Economic Co-operation and Development) show that Indonesia ranks low in mathematics ability. Similar results were also seen in the mathematics results of the 2015 TIMSS (Trends in International Mathematics and Science Study). Indonesia was in the lower category and ranked 44th out of 56 countries (Mullis, Martin, 2021). The questions used in PISA and TIMSS require critical and creative thinking (Widiastuti, 2022) . Therefore, it can be said that the results of PISA and TIMSS show the low critical thinking skills of Indonesian students.

Based on the results of interviews with fifth-grade teachers at five elementary schools in Purwakarta Regency. The 10 fifth-grade teachers who participated in this activity consisted of two teachers from SDN 1 Hegarmanah, two teachers from SDN 2 Cicadas, two teachers from SDN 1 Cicadas, one teacher from SDN Pasawahan Kidul, two teachers from SDN 2 Ciwareng, and one teacher from SDN 3 Mulyamekar. Interviews were conducted from January 13-31, 2025. Nine teachers believed that many students in their classes still had difficulty understanding the basic concepts of fractions, especially when comparing or operating with fractions with unlike denominators. Many students still had not mastered multiplication and division, making it difficult to simplify fractions or operate with fractions. Students have varying abilities; some grasp quickly, while others take longer. This requires more varied

learning to adapt to the needs of all students. And one teacher stated that they were hampered in motivating students, some of whom struggled to face learning challenges, resulting in students not actively participating in learning.

Interviews with teachers in Purwakarta Regency revealed a diverse profile of students' critical thinking abilities, depending on their level of understanding and basic mathematical skills. Some students are able to analyze problems independently, others still need guidance, and still others are less active in discussions and tend to follow their peers' answers without thinking for themselves. Furthermore, the profile of students' collaborative abilities in class also varies: some actively participate and share ideas; others are willing to work in groups but remain passive, waiting for instructions from their peers and lacking confidence in speaking or expressing their opinions; and still others are less engaged in discussions and rely solely on their peers to complete assignments.

Based on this background, to improve elementary school students' critical thinking skills and collaboration skills, it is necessary to study and develop appropriate learning models, one of which is the Problem-Based Learning (PBL) model, supported by the interactive Canva application. The PBL model assisted by the Interactive Canva Application is different from previous research in that it contains interesting teaching materials, LKPD, Fraction Songs, Videos, Educaplay games, and Quizizz.

METHOD

The research and development method (R&D) is a type of research frequently used in education. R&D is a scientific process for obtaining data, making it easier for researchers to produce, develop, and validate products. The characteristics of R&D are based on the opinion of Borg & Gall (1989) in (Okpatrioka, 2023) will be explained as follows: (1) developing products in the form of learning devices, namely teaching modules, teaching materials, methods, media, Student Worksheets/LKPD and assessment tools; (2) tiered in product assessment; (3) bridging the "gap" that occurs between educational research and practical research; (4) quantitative in validating the effectiveness, efficiency, and acceptability of products, but qualitative in compiling products and their revisions; (5) conducting field and distribution tests, field tests are conducted to validate prototypes, and distribution is the dissemination of prototypes that have been tested (products); (6) emphasizing specific problems related to practical problems in learning through applied research; (7) there are stages of evaluation in the products that are compiled.

The final product of this research and development is a tested Problem-Based Learning model assisted by the Canva Interactive application, consisting of teaching modules, teaching materials, media, student worksheets, and assessments. The subjects of this research were elementary schools in Purwakarta Regency. This development research used the Borg and Gall steps, which have 10 research steps (Artawan et al., 2023) , presented in Figure 1.

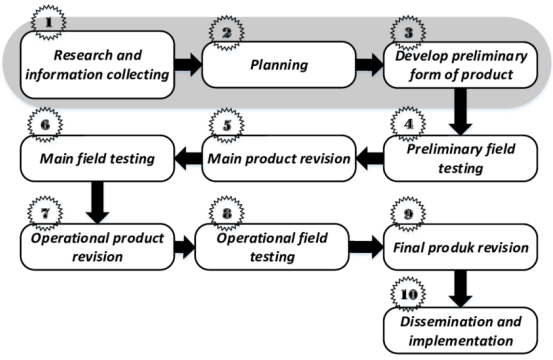

Figure 1. Borg and Gall's RnD Steps

Population refers to the entire research subject or phenomenon/unit that is to be researched or studied. (Mochamad Nashrullah, dkk 2023). The sampling design used is a fixed sampling design, namely by using samples based on certain qualifications (*purposive samples*) which are suitable for qualitative research. (Mochamad Nashrullah,dkk 2023). Based on the sampling design, the researcher chose the research subjects as fifth grade elementary school students located at SDN 1 Hegarmanah with a total of 24 students, SDN 3 Mulyamekar with a total of 48 students, SDN 2 Cicadas with 19 students, and SDN Cilangkap with 24 students. The research subjects were selected based on the following characteristics: 1) students have a relatively low ability to understand mathematical concepts; 2) teachers have not implemented a problem-based learning model assisted by interactive Canva media; and 3) students have a tendency to have low critical thinking skills.

The research design used is an explanatory design, this design is the most straightforward mixed method and is widely used in applied linguistics research. (Juanita Heigham, 2019). The word explanatory in the design name indicates explanation: qualitative findings are used to help explain, refine, clarify, or expand upon quantitative results. Quantitative and qualitative data are collected and analyzed sequentially: first, quantitative data are collected and analyzed, then qualitative data (Juanita Heigham, 2019).

The data analysis used was validity, reliability, discriminatory power, and difficulty index data analysis. The data analysis used SPSS and Microsoft Excel. This study produced a critical thinking ability test instrument for fifth grade elementary school students. This different test model was used to analyze the research model before and after. The paired sample t-test is one of the testing methods used to assess the effectiveness of the treatment, marked by the difference in the average before and after the treatment (Kaporina et al., 2023). Quantitative analysis with inferential statistical tests, namely paired sample t-test if the data is normally distributed or Mann-Whitney test if the data is not normally distributed, assisted by the SPSS application and looking for N-gain to determine the increase in students' critical thinking skills after learning using the PBL learning model assisted by the interactive Canva application and descriptive quantitative analysis is used to determine students' collaboration abilities during learning using the PBL model assisted by the interactive Canva application.

RESULTS AND DISCUSSION

Results

Conditions of the Objectivity of Mathematics Learning in Elementary Schools

This development is a Problem Based Learning model assisted by the Canva Interactive application that has been tested, namely teaching modules, teaching materials, media, student worksheets and assessments. Based on the research and development that has been carried out in accordance with the Borg and Gall research procedures, there are 10 research steps. The first stage is potential and problems, from the results of the interview obtained data that all teachers know the material of fractions in Mathematics in grade V with various answers. There are 6 teachers out of 10 respondents who think that conducting learning using concrete objects such as pieces of cake and folded paper by integrating the material into everyday life so that students better understand the concept of fractions. In addition, there are 2 teachers who think that applying a pictorial approach through videos, pictures and diagrams so that children are clearer in understanding the material. Then 2 others think that providing practice questions so that children better understand the concept of mathematics. The results of the analysis of teachers' answers can be seen in Figure 2 below:

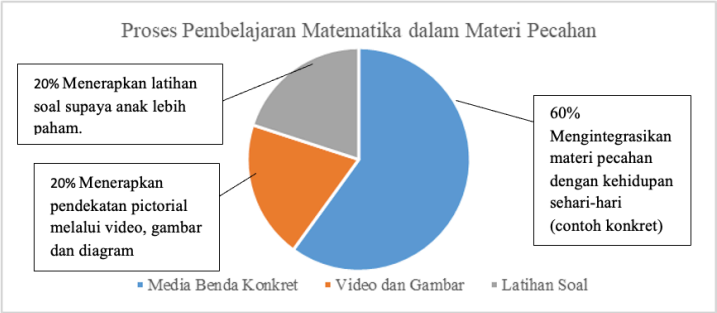

Figure 2. Mathematics Learning Process in Fraction Material

The interview results obtained data that the Mathematics learning that is considered effective is discussion and collaboration learning, using games, using ICT-based media, lectures, learning by involving students, and problem-based and project-based learning. The analysis results obtained data that problem-based learning related to students' lives and using ICT-based media is considered the most effective in Mathematics learning. The results of the analysis of teachers' answers can be seen in Figure 3 below:

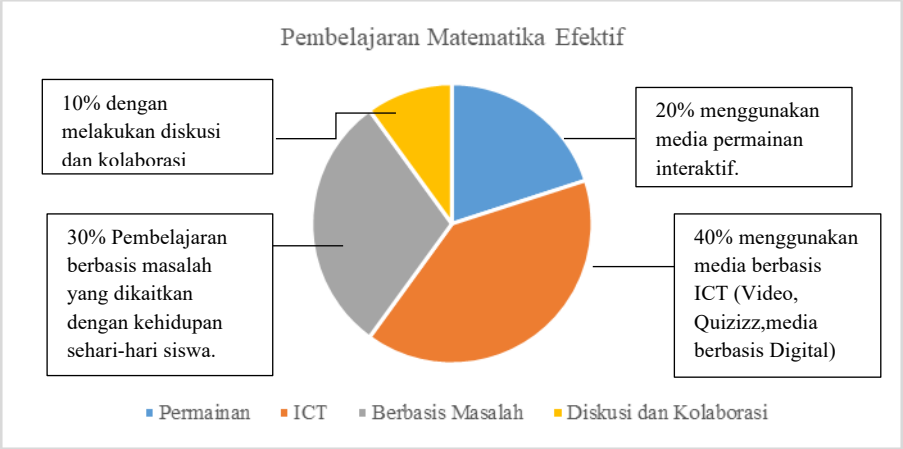

Figure 3. Mathematics learning that is considered effective

Nine teachers responded by using interactive learning media such as Math Playground, NCTM Web, Quizizz, Canva, educational YouTube videos, Desatika games, and Wordwall. One teacher, however, did not use interactive learning media due to a lack of IT skills. The analysis of the teachers' responses can be seen in Figure 4 below:

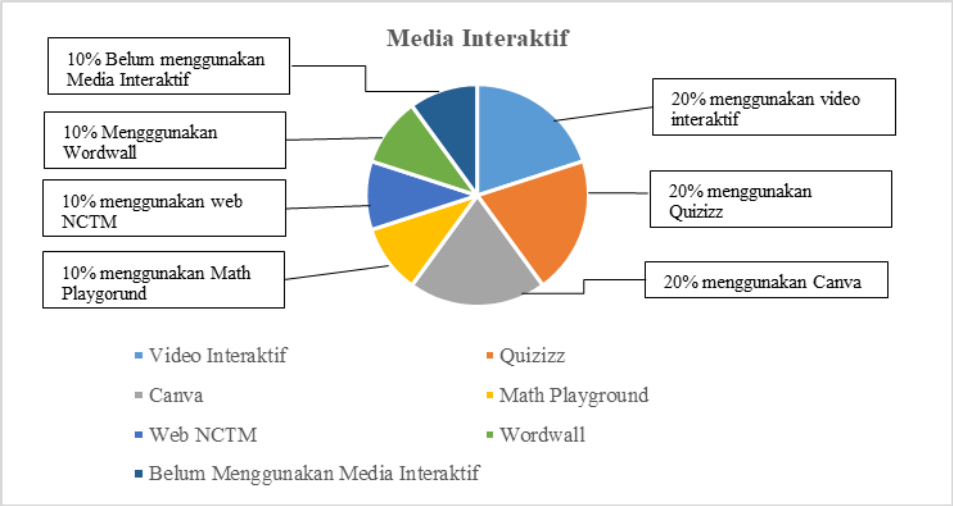

Figure 4. Interactive Media

The second stage involved gathering various information related to teaching materials or supporting media. Researchers used the sources presented in Table 1 as references.

Table 1. PBL Model References

No	Article Title	Authors
1.	Development of a 4C-Based E-Module (Critical Thinking, Collaboration, Communication, and Creativity) Using the Canva Application	Eka, Wijiastuti (2025)
2	Development of a Problem-Based Learning Model in Mathematics to Improve Investigative and Affective Skills	Berta Nurwidyastuti , Dhoriva Urwatul Wutsqa (2020)
3	Development of a Textbook to Develop 4C Skills (Critical, Creative, Collaborative, and Communicative) through the PBL Model in Biology Learning at SMP 5 Seluma	Deti Susanti, Risnanosanti (2019)
4	Development of Mathematics Learning Tools	Pattimura SC, Maimunah, Nahor Murani Hutapea (2020)
5	Using Problem-Based Learning to Facilitate Students' Mathematical Understanding	Benny Kurniawan, Dwikoranto, Marsini (2023)

Based on the collection of various information from various articles, it can be concluded that the development of the PBL model requires a sufficient allocation of time so that students are accustomed to problem-based learning activities. From various sources, articles argue that Mathematics lessons tend to be considered difficult and disliked by students. The lack of maximizing the use of technology in the learning process, so that students feel less interested. The need for follow-up by conducting an effectiveness test of teaching tools and interesting mathematics teaching materials to support the 4C skills (Critical Thinking, Collaboration, Communication, and Creativity) is more clearly presented in the form of Figure 5. below:

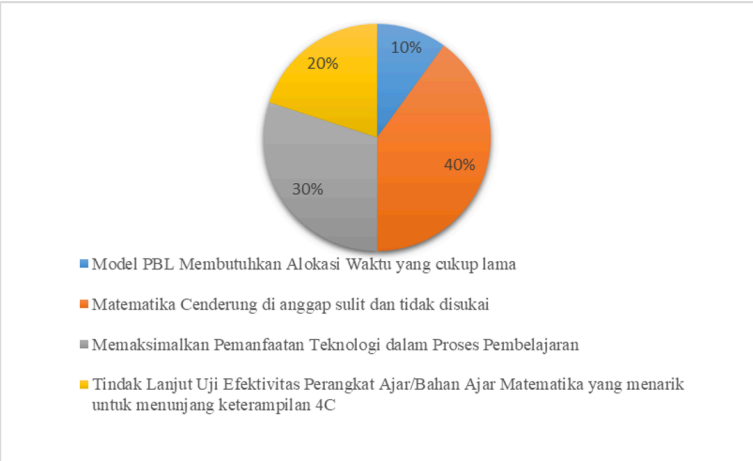

Figure 5. Results of Literature Study

The Feasibility of the Canva Interactive PBL Model to Improve Elementary School Students' Critical Thinking Skills

Once the first stage, namely potential and problems, and the second stage, namely collecting data/information, has been completed, the next step is to design the product. After the product is designed, the next step is to assess it by experts. The design validation in this learning media was tested by three expert validators: two expert lecturers and one expert teacher. The validation assessment by material experts analyzed three aspects: the feasibility of the lesson plan (RPP),

the feasibility of teaching materials, the feasibility of learning media, the feasibility of student worksheets (LKPD), the feasibility of learning evaluation, and the interview guidelines. The results of the validation test by material experts are presented in Figure 6.

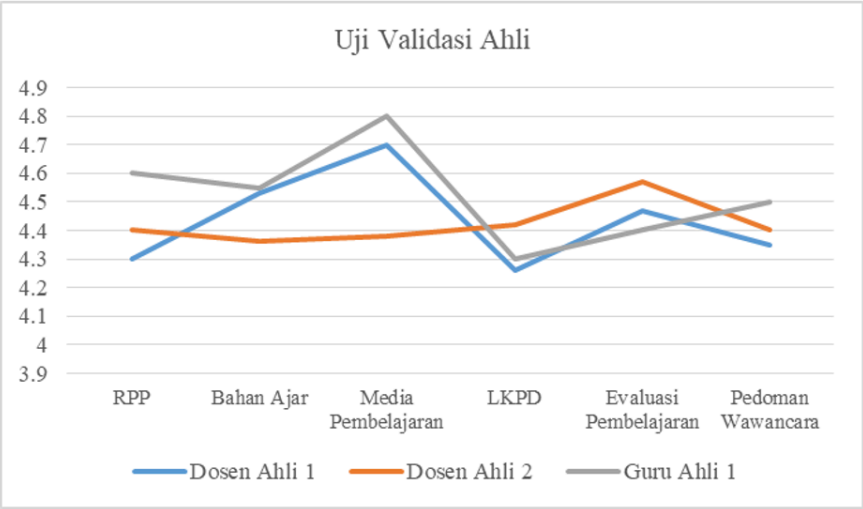

Figure 6. Expert Validation Test

Based on Figure 5, the results of expert validation obtained an average score of 4.46, with the criteria "Suitable for use without revision." The validation by the material expert was only carried out in one stage because the developed tool met the criteria in the first stage, so the validation stage was continued to the next validator.

Based on validation by two expert lecturers and one expert teacher, the PBL learning model supported by the interactive Canva application is considered suitable as a tool for mathematics learning. The feasibility of this model is certainly inseparable from the guidance, input, and suggestions of the experts. The data collection instrument in this study was a critical thinking ability test. A test instrument will be biased if it does not undergo a testing phase, potentially resulting in an inability to measure student abilities. The quality of the critical thinking ability test instrument, based on the aspects of validity, reliability, discriminatory power, and difficulty index, yielded the following results: Validity: After obtaining the data from the critical thinking ability test results, the next step was to test the validity of the questions using SPSS 27 software.

Initial field trials and product revision results for the Problem Based Learning Model Development Assisted by the Interactive Canva Application

a. Initial Field Trial of the PBL Model Assisted by the Interactive Canva Application to Improve Elementary School Students' Critical Thinking Skills

After the model instrument has been tested for validity, reliability, difficulty level, and discriminatory power, it is then applied in the learning process. The PBL learning model assisted by the interactive Canva application is validated and revised according to the input and suggestions of the validator, then the model is ready for product testing. The initial field trial to ensure the learning model is based on student responses provided. The responses provided are the results of the Pre-test and Post-test through a paired sample t-test using the SPSS application to measure the improvement in students' critical thinking skills after the implementation of the PBL learning model assisted by the interactive Canva application. The results are presented in Table 2.

Table 2. Results of Initial Field Trial of Critical Thinking Skills

Data	Pretest	Posttest
Data Totals	23	23
Min	0	0
Max	28	70
Mean	6,61	31,48
Normality	0,200 (Normal)	0,200 (Normal)
Paired Sample T-Test	0,001 (Significantly different)	
n-gain	0,26 (Ineffective Category)	

Based on table 2 above, it shows that in the paired sample t-test with Sig (2-tailed) which is 0.001 < 0.05. Based on this, it can be concluded that H0 is rejected, namely there is a difference in students' critical thinking abilities using the PBL learning model assisted by the Canva Interactive application. in the initial field trial at SDN 1 Hegarmanah obtained an N-Gain percentage of 0.26 with the criteria of "ineffective" application of the PBL model assisted by the Canva Interactive application to improve students' critical thinking abilities.

b. Initial Field Trial of the PBL Model Assisted by the Interactive Canva Application to Improve Elementary School Students' Collaboration Skills

The results of the initial field trial to determine the effect of the PBL model assisted by the interactive Canva application to improve collaboration skills, namely through the results of classroom observations at the 1st meeting as a Pretest and the 3rd meeting as a Posttest through a paired sample t-test using the SPSS application are presented in table 3 below:

Table 3. Results of Initial Field Trial of Collaboration Capabilities

Data	Pretest	Posttest
Data Totals	23	23
Min	0	6
Max	7	12
Mean	3,17	8,87
Normality	0,182 (Normal)	0,182 (Normal)
Paired Sample T-Test	0,001 (Significantly different)	
n-gain	5,8776 (effective Category)	

Based on table 3 shows that in the paired sample t-test with Sig (2-tailed) which is 0.001 < 0.05. Based on this, it can be concluded that H0 is rejected, namely there is a difference in students' collaboration abilities using the PBL learning model assisted by the Canva Interactive application. in the initial field trial at SDN 1 Hegarmanah obtained an N-Gain percentage of 5.8776 with the "effective" criteria for implementing the PBL model assisted by the Canva interactive application to improve students' collaboration abilities.

1. Extensive field trials and product revision results for the Problem Based Learning Model Development Assisted by the Interactive Canva Application

a. A Large-Scale Field Trial of the PBL Model Assisted by the Interactive Canva Application to Improve Elementary School Students' Critical Thinking Skills

During the initial field trial, input was received to improve the Canva Interactive application which was hampered in the Educaplay game and at stage 5 in the PBL model, namely

analyzing and evaluating the problem-solving process, students not only made recipes from collaboration but also made food products based on the results of compiling recipes using fractions so that learning was meaningful and contextual, close to students' daily lives.

Table 4. Results of the Field Trial of Critical Thinking Skills

Data	Pretest	Posttest
Data Totals	18	18
Min	2	0
Max	18	74
Mean	4,89	42,78
Normality	0,146 (Normal)	0,146 (Normal)
Paired Sample T-Test	0,001 (Significantly different)	
n-gain	0,40 (effective Category)	

The results of the extensive field trial at SDN 2 Cicadas based on table 4 above show that the paired sample t-test with Sig (2-tailed) is 0.001 <0.05. Based on this, it can be concluded that H0 is rejected, namely there is a difference in students' critical thinking abilities using the PBL learning model assisted by the Canva Interactive application carried out at SDN 2 Cicadas. Then the researcher revised the product and conducted a large-scale product trial, namely SDN 2 Cicadas obtained an N-Gain percentage of 0.40 with the criteria of "Quite Effective" in improving students' critical thinking abilities.

b. A Large-Scale Field Trial of the PBL Model Assisted by the Interactive Canva Application to Improve Elementary School Students' Collaboration Skills

After conducting the initial field trial and subsequent revisions, a large-scale field trial was conducted to determine the effect of the PBL model assisted by the interactive Canva application to improve collaboration skills, as shown in Table 5 below:

Table 5. Field Trial Results of Collaboration Capabilities

Data	Pretest	Posttest
Data Totals	18	18
Min	0	6
Max	7	12
Mean	3,11	9,28
Normality	0,200 (Normal)	0,200 (Normal)
Paired Sample T-Test	0,001 (Significantly different)	
n-gain	6,3303 (effective Category)	

Based on table 6 shows that in the paired sample t-test with Sig (2-tailed) which is 0.001 < 0.05. From these results it can be concluded that H0 is rejected, namely there is a difference in students' collaboration abilities using the PBL learning model assisted by the Canva Interactive application. in a wide field trial at SDN 2 Cicadas obtained an N-Gain percentage of 6.3303 with the "effective" criteria for implementing the PBL model assisted by the Canva interactive application to improve students' collaboration abilities.

The Effectiveness of the PBL Model Assisted by the Interactive Canva Application to Improve Elementary School Students' Critical Thinking Skills

1. The Effectiveness of the PBL Model Assisted by the Interactive Canva Application to Improve Elementary School Students' Critical Thinking Skills

The results of the product revision based on an evaluation of a large-scale trial at SDN 2 Cicadas, researchers conducted an effectiveness test on a larger scale or with actual operational conditions, namely applied to three classes in two different elementary schools: SDN 3 Mulyamekar classes 5A and 5B and Class 5A SDN Cilangkap.

Table 6. Results of the Critical Thinking Skills Effectiveness Test

Data	Pretest	Posttest
Data totals	72	72
Min	0	14
Max	14	88
Mean	14	88
Normality	0,200 (Normal)	0,200 (Normal)
Paired Sample T-Test	0,001 (Significantly different)	
n-gain	0,41 (effective Category)	

Table 6 above shows that the paired sample t-test with a Sig (2-tailed) of 0.001 < 0.05. Based on this, it can be concluded that H0 is rejected, namely that there is a difference in students' critical thinking abilities using the PBL learning model assisted by the Canva Interactive application at Cilangkap Elementary School. The researchers then revised the product and conducted a large-scale trial. Cilangkap Elementary School obtained an N-Gain percentage of 41.23, categorized as "quite effective" in improving students' critical thinking abilities. The novelty of this study compared to previous research is that the PBL learning model assisted by the Canva Interactive application for fractions is categorized as quite effective in improving students' critical thinking abilities.

The researchers then disseminated the product to social media through the provided link. This aims to ensure that users from all walks of life can easily access the PBL learning model assisted by the Canva Interactive application.

2. The Effectiveness of the PBL Model Assisted by the Interactive Canva Application to Improve Elementary School Students' Collaboration Skills

After conducting extensive field trials and subsequent revisions, an effectiveness test was conducted with more samples to determine the effectiveness of the PBL model assisted by the interactive Canva application to improve collaboration skills, as shown in Table 7 below:

Table 7. Results of the Collaboration Ability Effectiveness Trial

Data	Pretest	Posttest
Data totals	72	72
Min	0	6
Max	7	12
Mean	3,04	9,19
Normality	0,001 (not Normal)	0,001 (not Normal)
Paired Sample T-Test	0,001 (Significantly different)	
n-gain	6,3172 (effective Category)	

Table 7 shows that the paired sample t-test with a Sig (2-tailed) of 0.001 < 0.05. From these results, it can be concluded that H0 is rejected, namely that there is a difference in students' collaboration abilities when using the PBL learning model assisted by the interactive Canva application. The effectiveness trial obtained an N-Gain percentage of 6.3172, with the

criterion of "effective" for implementing the PBL model assisted by the interactive Canva application in improving students' collaboration abilities.

The researchers then disseminated the product on social media through a provided link. This aimed to ensure that users from all walks of life could easily access the PBL learning model supported by the interactive Canva application in the following Figure 7 bellow.

Figure 7. Canva Interactive application

Discussions

The development of a PBL learning model supported by the interactive Canva application in elementary school mathematics has been shown to significantly improve students' critical thinking and collaboration skills. To address global challenges in the implementation of 21st-century learning, teachers can create innovative and interactive learning using Canva-based technology to stimulate students' critical thinking skills (Halimah et al., 2024). The application of this model was implemented by 5 teachers in grade V of elementary schools in Purwakarta Regency, this allows students to be actively involved in the learning process by solving contextual problems that are relevant to their daily lives and in accordance with the characteristics of problems experienced by elementary school students to improve students' critical thinking skills and collaboration skills.

In this study, the PBL model was applied to the "Fractions" topic, where the teacher began the lesson using the interactive Canva application, which included a video explaining the concept of fractions through food division. This is in line with the opinion of (Setyaningrum, Ermawati, 2023) The difficulty in understanding the concept of fractions occurs because teachers do not provide concrete examples from the students' surroundings when delivering the material. The videos in the Canva Interactive app spark students' curiosity, according to (Miftahul Jannah et al., 2023) Canva learning media is considered effective for students in facilitating understanding of abstract material in Mathematics subjects.

In simple terms, in PBL, teachers present students with problems and then require them to solve them on their own. Students can learn meaningfully in mathematics if the learning process is presented in an engaging way to keep them engaged (Panut Setiono,dkk 2021). The problems presented are contextual issues close to students' lives. Teachers simply help students develop their thinking to acquire the knowledge necessary to solve the problems. Students actively acquire the knowledge needed from the given problems. Students' active role in the learning process demonstrates that PBL is not a process of transferring knowledge from teacher to student. Instead, teachers act as mediators and facilitators, offering problems to students to gain their own knowledge. This is an alternative learning model that allows students to improve their thinking skills (reasoning, communication, and connections) in problem-solving.

Bese on (Tamim & Grant, 2013) This Problem Based Learning model aims to increase students' motivation to learn and develop knowledge and skills (higher-order thinking). The

implementation of the PBL model also has a positive impact on student motivation and self-confidence. One teacher said, "PBL learning is very fun and challenging. Students are given contextual problems related to their cooking hobby, namely creating their own food recipes. Students feel more interested in the interactive Canva application which includes complete videos, student worksheets, materials, Quizizz, and Educaplay games." In line with (Amaliyah & Astuti, 2024) Canva-assisted interactive presentation media can enrich the learning experience with attractive visualizations and easy-to-understand content, so that it can be combined between the PBL model and this technology-based interactive learning media, it is hoped that students' critical thinking skills can increase significantly and support the achievement of the goals of the 7 Habits of Great Indonesian Children Movement.

According to Ennis (1985), there are 5 indicators of critical thinking ability which can be seen in Table 9. Critical thinking focuses on understanding something which is done with full awareness and is directed towards a goal (Suharyani et al., 2023). Basically (Nugraha, 2018) Developing critical thinking in two major aspects: character formation (disposition) and abilities. PBL encourages students to be more active in finding solutions to problems, collaborating with peers, and presenting their findings confidently. Another obstacle, according to (Handayani et al., 2025) What was identified was students' low reflective ability in expressing ideas and evaluating arguments. This was because most students were not yet accustomed to problem-based learning, which requires active involvement, both cognitively and socially.

Table 8. Critical Thinking Ability Indicators

Critical Thinking Indicators	Critical Thinking Sub-Indicators	Sub-Indicator Details
Providing simple explanations (elementary clarification)	Focusing questions, Analyzing arguments, Responding to explanations or challenges	Identifying or Formulating Problems
Building basic skills (basic support)	Adapting to sources	Identifying and Addressing Relevance and Irrelevance
Drawing conclusions (inference)	Inducing and considering induction results	Answering the Question "Why?"
Providing further explanations (advanced clarification)	Defining terms and considering them	Ability to Provide Reasons
Developing strategies and tactics (strategy and tactics)	Deciding on a course of action	Generalizing

A moderate contribution to critical thinking skills is found in the indicators of providing simple explanations and developing strategies, namely deciding on a course of action. In these indicators, the average student ability is 62.58 and 63.18 (Table 7). Based on the question grid, it is known that students are able to ask and answer questions that require explanations, solve problems related to addition and subtraction of fractions correctly by being presented with text stimuli in the form of shopping lists and number cards, and are able to guess and combine addition and subtraction operations of mixed fractions with different denominators correctly. The indicator of providing simple explanations achieved the highest average compared to other indicators because students have been trained in identifying a problem in working on questions, in line with the opinion of (Lestari, Endri Puji dan Siswono, 2022) Students identify information in questions by writing down what is known and what is asked and the subject is also able to provide a simple explanation to clarify what is understood.

Table 9. Average Score of Mathematical Critical Thinking Ability

No	Indicator	Mean						Criteria
		Initial Lap Trial		Wide Area Test		Effectiveness Test		
		Pre	Post	Pre	Post	Pre	Post	
1	elementary clarification	0.85	1.87	0.53	16.86	29.41	62.58	Medium
2	basic support	0.37	1.78	0.58	20.86	10.32	58.51	Low
3	inference	0.15	1.24	0	15.41	0.5	39.11	Low
4	advanced clarification	0.15	1.3	0	16.36	0.51	46.20	Low
5	stratetgy and tactics	0.17	1.67	0.11	24.91	0.02	63.18	Medium

Meanwhile, the lowest contribution, with an average score of 39.11, was found in the inference indicator. In the problem grid, which presented a shopping list and fraction cards, students were able to make deductions and assess the results of deductions for addition and subtraction of mixed fractions with unlike denominators. This occurred due to students' low interpretation skills, as students were not yet accustomed to interpreting information in the form of graphs or images and a lack of practice given to students (Sarip, Nurazizah, 2022).

The social dimension of PBL has a significant influence on group productivity, but recent studies show how students self-monitor some of the main complaints of PBL without a tutor (Rintaro Imafuku, 2015). In short, the social processes of PBL should not be ignored if we want to meaningfully inform educational practice through peer tutor (Rintaro Imafuku, 2015). This way, students feel more engaged in the learning process and are more interested in learning the material in depth. Furthermore, group discussions provide opportunities for students to practice critical thinking and express their opinions openly. To that end, teachers provide guidance on using the Canva Interactive app and practice sessions on Chromebooks to ensure all students feel prepared before the lesson begins. This demonstrates that while technology can be challenging, with the right approach, students can still utilize it effectively in the learning process.

PBL model according to (Bendermacher et al., 2023) Stimulates students to play an active role in planning, monitoring, and evaluating their own learning process. Although there were challenges in its implementation, such as technical difficulties and a lack of confidence in some students, the teacher's appropriate approach successfully overcame these obstacles and improved students' critical thinking skills in Mathematics. Thus, the PBL model has a significant positive impact on the development of students' critical thinking skills in elementary schools.

Table 10. Average Score of Collaboration

No	Indicator	Mean						Criteria
		Initial Lap Trial		Initial Lap Trial		Initial Lap Trial		
		Pre	Post	Pre	Post	Pre	Post	
1	Cooperation	1.04	2.47	1.2	2.6	1.3	3.0	Very Proficient
2	Communication to achieve common goals	0.82	2.08	0.9	2.16	0.9	2.6	Proficient
3	Positive interdependence	0.74	2.2	0.5	2.2	0.5	2.2	Proficient
4	Social coordination	0.56	2.08	0.4	2.2	0.4	2.2	Proficient

A very proficient contribution to collaboration skills is found in the cooperation indicator, where the average collaboration skill is 3.0 (Table 10). Students are able to demonstrate positive attitudes when working on a project in groups (3 positive attitudes: actively participating, contributing to the group, maintaining the involvement of all groups). This is evidenced by their ability to distribute tasks more systematically, aligning them with the expertise of each group member. Effective role division allows students to work together effectively to complete the "Kedai Pecahan" Student Worksheet. In line with (Mustamin et al., 2024) PBL encourages students to resolve conflicts that arise during teamwork. This empowers teachers to create a conducive environment for students to feel comfortable discussing, sharing ideas, and completing projects together (Listiana et al., 2025).

In Vygotsky's view, all high-level cognitive work in humans has its origins in the social interactions of each individual in a particular cultural context (Santoso Yohanes, 2010). In line with Vygotsky's theory, researchers developed a Problem-Based Learning (PBL) model supported by the Canva Interactive application, which included Educaplay games and role-playing as sellers and buyers at "Kedai Pecahan" (Fragment Shop). This led to improved analytical, evaluation, and synthesis skills in dealing with various complex situations and problems. Various studies have shown that the Problem-Based Learning (PBL) model has a positive influence on students' critical thinking and collaboration skills at the elementary school level.

CONCLUSION

Based on the research results presented in the previous discussion, it can be concluded that this study produced a learning model assisted by the interactive Canva application on fraction material that can improve students' critical thinking skills and collaboration abilities. The results of the feasibility test were assessed by experts with the criteria of being feasible. And in the product trial obtained the criteria of "ineffective" in improving students' critical thinking skills in the initial field trial. In a large-scale field trial obtained the criteria of "quite effective" in improving students' critical thinking skills. The conclusion contains a suggestion that the PBL learning model assisted by the Interactive Canva application is quite effective in improving students' critical thinking skills and collaboration abilities. Then the PBL learning model assisted by the interactive Canva application is only on fraction material, so it needs to be further developed in other materials, in order to motivate and improve students' critical thinking skills in the active learning process.

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