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The Influence of the PBL Model Accompanied by Canva Al Animation Videos on Critical Thinking Skills in Elementary School Science Learning

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Abstract

In the science learning process, one of the abilities that needs to be developed to achieve 21st century skills is the ability to think critically in solving or resolving problems. Critical thinking is an important competency that must be developed through learning. In the science learning process, one of the abilities that needs to be developed to achieve 21st century skills is the ability to think critically in resolving or solving problems. Students' critical thinking abilities must be honed and trained in the classroom. There are lots of learning media that use the latest technology in the era of society 5.0, one of which is animated video learning media. Efforts to develop students' optimal critical thinking skills require interactive classes, students are seen as thinkers, not people being taught, and teachers act as mediators, facilitators and motivators who help students learn, not teach. Animated videos are a different learning media and can make students focus on learning, namely animated video-based learning media. Animation is a collection of images that will be processed in such a way that they can produce movement. This research aims to test the effect of the PBL model accompanied by Canva AI animated videos on critical thinking skills in science learning. The use of video media in the form of animated video media can provide a good response to students. Data collection methods include interviews, observations, and learning outcomes tests to measure students' critical thinking abilities. The data analysis technique used was a normality test with a t test with an independent sample t test which showed that the PBL model accompanied by Canva AI animation videos had a significant effect on critical thinking skills.

Keywords Animated-Videos, Canva, Critical Thinking-Skills. PBL-Model.

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Introduction

The 21st century is known as the century of knowledge where knowledge becomes the main foundation of all aspects of life to increase knowledge is inseparable from the world of education, because education is the main path to a knowledgeable society. In the 21st century or what is often called the digital era, teachers are increasingly required to be more active,

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critical, innovative, creative, and collaborative towards the development of the technological era so that they are able to follow current teaching trends.(Sadriani et al., 2023)

Knowledge itself grows increasingly specialized and expands exponentially.(Juniantari et al., 2023). The development of technology and information brings many changes in the social, economic, political, and technological fields. In reality, currently the critical thinking skills of students in some educational institutions in Indonesia are still categorized as low. The factors that influence the low level in these schools are that learning is still dominated by teachers so that they do not train students' critical thinking skills. The lack of critical thinking skills was also conveyed by(Diva & Purwaningrum, 2023)that the critical thinking ability of elementary school students is relatively low. Efforts to form optimal critical thinking abilities of students require interactive classes, students are seen as thinkers not as those who are taught, and teachers act as mediators, facilitators, and motivators who help students learn not teach. When working with using critical formulation, checking formulation data and handling possible solution strategies in finding the right solution to complete the task. Because if the solution is not right, it can cause new problems that must be solved(Yanti et al., 2024).Students' critical thinking skills must be honed and trained in the classroom. Teachers can provide various stimuli so that students have critical thinking skills. In learning, the model used by the teacher influences the abilities and skills of students.(Basic & Jambi, 2022).

In the process of learning science, one of the abilities that need to be developed to achieve 21st century skills is the ability to think critically in solving or solving problems. Critical thinking is one of the essential competencies that must be developed through learning. If not trained to think critically, students cannot choose, sort, and process it into knowledge, and vice versa if they are accustomed to thinking critically, students understand it more easily, and the teacher only functions as a facilitator and motivator.(Wiryanto et al., 2021). Critical thinking is a person's ability to find information and solutions to a problem by asking themselves to dig up information about the problem they are facing.(Novitasari, 2024). By forming habits of thinking or Habits of Mind in students, it means that a teacher also teaches students to become individuals with superior character, who are diligent, honest, care about the environment, think critically, and are creative.(Diva & Purwaningrum, 2023).

Based on the results of the interview that has been conducted with one of the fourth grade teachers of SDN Dabasah 1 Bondowoso explained that the learning process carried out so far at SDN Dabasah 1 generally uses question and answer methods, assignments, lecture methods and rarely uses student-centered learning models. In addition, there is no habituation from teachers to provide learning that can train students' abilities in solving problems. This causes students' abilities in solving problems in science learning to be less than optimal. It can be seen that most students cannot identify problems in questions and have difficulty in solving problems in questions.

Problem Based Learning is one of the learning models recommended for use in the 21st century that can improve students' critical thinking skills. One way that teachers can do to realize the success of learning in training students to be independent and able to think creatively is by selecting a learning model that suits the learning material. One of the learning models that can improve students' creative thinking is the Problem Based Learning (PBL) model.(Handayani & Koeswanti, 2021). Problem Based Learning (PBL) helps teachers create a learning environment that begins with important and relevant problems for students, and allows students to gain more learning experiences.(Suswati, 2021). Problem Based Learning

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(PBL) is a learning method that focuses on problem solving and applying concepts in real-world situations.(Putri et al., 2023). The use of learning models is very important to attract students' interest in learning so that it can improve learning outcomes. Through PBL, students are involved in solving real problems that not only strengthen their critical thinking skills, but also their creativity and communication skills. Through knowledge transfer, PBL encourages students to develop critical thinking skills, solve problems independently, and collaborate in groups to find solutions.(Goddess, 2025). However, although PBL has been proven successful in various countries, its implementation in Indonesia is still limited, especially at the elementary school level.(Thessaloniki & Sijabat, 2024).

Media that can be combined with the Problem Based Learning (PBL) learning model is multimedia media. There are many learning media that use the latest technology in the era of society 5.0, one of which is animated video learning media. Animated videos are one of the different learning media and can make students focus on learning, namely animated video-based learning media. Animation is a collection of images that will be processed in such a way that they can produce movement. So, animated videos are moving images that come from a collection of various objects that have been specially arranged so that they move according to a predetermined flow.(Farida & Fuadiah, 2022). This animated video media is in the form of a video or moving image display and is equipped with audio. The use of video media in the form of animated video media can provide a good response to students. Digital-based learning media can increase students' enthusiasm for learning and learning can be repeated because the media can be used online or offline. Current technological advances can be one solution to the limitations of learning media. One of them is with learning media in the form of videos that are made interesting with animation, so that students are interested in watching the video. Learning media in the form of videos is one of the innovative audio-visual media that can support more interesting learning.(Rahmawati & Atmojo, 2021). Canva is an artificial intelligence technology that allows users to create attractive and efficient designs.(Maulid et al., 2024). With artificial intelligence technology, Canva can provide suggestions for the right design style with color and font recommendations that match the purpose of using the design. In the world of education, Canva allows teachers to create presentations that are interesting and easy for students to understand. One of the subjects that also uses Canva as a learning medium is science learning. The advantages of the animation media that will be developed are that this animation media is very suitable for elementary schools because it is in accordance with the characteristics of elementary school students who like pictures and are interesting(Sukarini et al., 2021). The material contained in the science subject includes physics, chemistry, and biology material which are integrated with each other.(Citradevi, 2021). Especially in science subjects whose material is abstract, by utilizing Canva, students can be helped in seeing the objects being studied directly and fostering students' interest in learning activities.(Tri Wulandari & Adam Mudinillah, 2022). The use of animated video media to improve children's listening skills is the solution in this study. Animated learning videos will be more interesting to use in learning to improve children's listening skills if they are packaged in the form of animation, considering that the audience are children who are certainly interested in new things they encounter.(Ariani et al., 2021), Animated video media has been widely used by previous researchers to overcome low student motivation and interest in learning as well as the learning outcomes achieved by students.(Sari & Yatri, 2023).

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Media that can be combined with the Problem Based Learning (PBL) learning model is multimedia media. Several studies related to the use of the Problem Based Learning learning model include the following. First, research conducted by (Jauhari et al., 2024) that the PBL learning model assisted by audio-visual media is effectively applied to learning, influencing the learning outcomes of class V SDN Pedurungan Lor 02 Science. The average student before being given treatment was 61.08 while the average student after being given treatment was 86.73 higher than before being given treatment. The average learning outcomes after being given treatment increased by 25.65. Second, research conducted by(Rahmawati & Rahmawati, 2024)Problem-based learning models assisted by multimedia padlet influence students' critical thinking skills. Digital-based learning media can increase students' enthusiasm for learning and learning can be repeated because the media can be used online or offline (Ambarita, 2021; Kusnandar, 2014; Setiawan et al., 2020). Canva is an artificial intelligence technology that allows users to create attractive and efficient designs.(Maulid et al., 2024).

Based on the background explained above, the researcher will conduct an experimental study entitled "The Effect of PBL Model Accompanied by Canva AI Animation Videos on Critical Thinking Skills in Elementary School Science Learning". The purpose of this study is to determine whether or not there is an effect of the PBL learning model on critical thinking skills in science learning.

Methodology

The type of research conducted is experimental research. Experimental research methods can be defined as research methods used to find the effect of certain treatments on others under controlled conditions. The research design used is a quasi-experimental design with a non-equivalent control group design research pattern. This none-equivalent Control Group design uses an experimental group and a control group. Treatment is given to the experimental group, while the control group is not. The form of the none-equivalent Control Group design can be seen in the following image.

Experiment	O_1	X	O2
Control	O_1		O2

Figure 1. None-Equivalent Control Group Design

Result and Discussion

One-Sample Kolmogorov-Smirnov Test

		Experiment	Control
N		30	30
Normal Parametersa,b	Mean	64,933	45,330
	Std. Deviation	8.8201	10.0743
Most Extreme Differences	Absolute	.214	.188
	Positive	.153	.188

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Negative	-.214	-.119
Test Statistics	.214	.188
Asymp. Sig. (2-tailed)	.001c	.008c

a. Test distribution is Normal.

b. Calculated from data.

c. Lilliefors Significance Correction.

Figure 2. Normality Test of Critical Thinking Ability

Based on the One-Sample Kolmogorov-Smirnov test above, it shows that the sig value in the experimental class is 0.001 and in the control class 0.008. The Sig value obtained in this test has a lower value than the minimum requirement limit for normal data in the normality test, which is 0.05. Based on the test above, the data on students' critical thinking skills in this study were not normally distributed. The results of data that were not normally distributed were continued with a non-parametric statistical test using the Mann-Whitney U test as follows.

Test Statistics

	Mark
Mann-Whitney U	69,500
Wilcoxon W	534,500
Z	-5,659
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: Class

Figure 3. Output results from the Mann-Whitney U test of Critical Thinking Ability

Based on the output table above, it can be seen that the Mann-Whitney U test with the SPSS version 26 program that has been carried out obtained an A.Symp.sig (2-tailed) value of 0.000 (p-value ≤ 0.05) so that Ho is rejected and Ha is accepted. So it can be interpreted that there is a significant difference in students' critical thinking skills between the experimental class and the control class. The population of this study was grade IV students of SDN Dabasah 1 Bondowoso in the even semester of the 2024/2025 academic year with 30 students in each class. Based on the homogeneity test table using the t-test method, the t-count value is 0.686. The coefficient value shows that it is greater than 0.05 at a significance level of 5% so that it can be concluded that there is no difference in variance between the two groups that are used as research subjects and it can be stated that classes IVA and IVB are homogeneous. and ttable of 1.701. The experimental and control classes

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were chosen, namely class IVA as the experimental class and IVB as the control class. The data collection methods used in this study were interviews, tests, and documentation. While the data analysis techniques used were normality tests and t-tests.

DISCUSSION

The second objective of this study is to examine the influence of the Problem Based Learning (PBL) learning model on students' critical thinking skills. The focus of this goal is to find out the extent to which the PBL model can improve or influence students' cognitive aspects in critically solving problems. Data on students' critical thinking skills was obtained through the implementation of tests that were specially prepared to measure aspects of critical thinking. The questions in the test were compiled based on the indicators of critical thinking skills developed by Facione, namely interpretation, analysis, evaluation, inference, explanation, and self-regulation. Each of these indicators represents an important element in critical thinking that allows researchers to deeply evaluate students' thinking skills in dealing with complex problems. The PBL model was chosen because this approach emphasizes student-centered learning, by stimulating them to actively find solutions to the real problems given. Through this process, students are not only required to understand the material conceptually, but also to be able to develop high-level thinking skills such as critical thinking. It is hoped that through the implementation of the PBL model, students will be able to identify problems appropriately (interpretation), analyze available information, evaluate various possible solutions, draw logical conclusions, explain their thoughts systematically, and reflect on the thought process that has been passed. Thus, this study not only aims to measure the final outcome of critical thinking skills, but also to understand the learning processes that contribute to the development of these skills. The results of this research are expected to contribute to the development of effective learning strategies in the educational environment, especially in encouraging students to become critical and independent thinkers.

Based on the data from the research results, it can be seen that the critical thinking skills of students in the experimental class are better than those of students in the control class. Although the average score of students' critical thinking skills in the experimental class is still classified as "adequate" according to the criteria put forward by Riduwan, the improvement that occurred still shows a positive direction. To find out the significant difference between the two groups, a non-parametric statistical test was carried out the Mann-Whitney U Test, considering that the data obtained was not distributed normally. The analysis was conducted using IBM SPSS Statistics software version 26. Based on the results of the hypothesis test, it is known that the significance value indicates a rejection of the null (Ho) hypothesis, which means that there is a significant difference between the critical thinking ability of students in the experimental class and the control class. These findings indicate that the use of animated videos as part of the implementation of the Problem Based Learning (PBL) learning model has a positive influence on improving the critical thinking skills of elementary school students. Thus, the integration of interactive visual media such as animated videos in the PBL model has been proven to be able to help students develop high-level thinking skills more effectively compared to conventional learning methods.

One of the obstacles faced during the implementation of learning using the Problem Based Learning (PBL) model accompanied by Canva AI-based animation video media is the

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difficulty in conditioning students during the learning process. This is due to the lack of experience students in using interactive visual-based learning media such as animated videos. Most students rarely, if ever, were exposed to these types of media in previous teaching and learning activities. As a result, many students experience confusion in understanding the flow of the material presented through videos, as well as difficulties in connecting the information obtained with the assignments that must be done in the Student Worksheet (LKPD). This condition has an impact on the effectiveness of the learning process, where students need more guidance to follow the stages in the PBL model. In addition, teachers also need to take additional time to explain the steps of working on the LKPD in detail, so that all students can understand and follow the instructions correctly. Therefore, a more adaptive mentoring strategy and initial training in the use of animated video media are needed, in order to increase students' readiness to participate in this innovative PBL-based learning. Not only that, this obstacle also shows that the integration of technology in learning, although it offers various advantages, still requires careful preparation in terms of the readiness of students, teachers, and other supporting facilities. The lack of digital literacy of students is a challenge in itself that must be overcome gradually. For example, some students seem to focus more on the visual appearance of the video than on the educational content, so that their attention is distracted from the core of the learning. In addition, the difference in the speed of students' understanding of digital-based materials also causes inequality in the achievement of learning outcomes, where students who are familiar with visual media tend to absorb information faster than other students.

To overcome this obstacle, a systematic mitigation strategy is needed, such as initial training on the use of learning videos, socialization of the stages of LKPD work visually and gradually, and provision of adaptation time at the beginning before PBL activities fully begin. Teachers are also expected to take a differentiation approach, namely adjusting the method of delivering material and mentoring according to the characteristics and learning needs of each student. Thus, the use of animated videos in learning is not only a complementary medium, but can actually serve as an effective tool to improve students' understanding of concepts and critical thinking skills through the PBL model.

In addition, the limited time, which is 2 hours of lessons in each meeting, causes less than optimal learning. Another factor that causes low student scores is because of two types of tests, namely 10 questions for the description of the learning outcome test and 6 questions for the description of the critical thinking ability test with a time allocation of 60 minutes as well as the implementation at the same time as the school exam. Based on the discussion above, it shows that _jika learning using the PBL model accompanied by Canva AI animation videos can be used as information and alternatives to be used in science learning in the classroom to improve learning outcomes and abilities.

Conclusion

Based on the data that has been obtained in accordance with the research, the conclusion is that there is a significant influence of the PBL model accompanied by Canva AI Animation Videos on students' critical thinking skills. One of the obstacles faced during learning using the PBL model accompanied by Canva AI animation videos is the difficulty of conditioning students, because they rarely or almost never use animation videos in learning so that many

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students are still confused about the steps for working on their LKPD. In addition, the limited time, namely 2 hours of lessons in each meeting, causes learning to be less than optimal. Another factor that causes low student scores is because there are two types of tests, namely 10 descriptive questions for learning outcome tests and 6 descriptive questions for critical thinking ability tests with a time allocation of 60 minutes and its implementation is the same as school exams. Based on the discussion above, it shows that learning using the PBL model accompanied by Canva AI animation videos can be used as information and an alternative for use in science learning in class to improve learning outcomes and abilities..

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