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The Effect Of Using Problem Based-Learning Model Assisted By Education Games On Motivation And Critical Thingking Skill

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Abstract: This study aims to determine the effect of using the problem based-learning model assisted by education games on the motivation and critical thinking skills of the mathematics subject of grade IV students of SDN 1 Krebet. The method in this study is a quantitative method with a nonequivalent control group design. Sampling is called purposive sampling and class IVA is obtained as the experimental class and IVB as the control. Data collection techniques through questionnaire methods and test methods with t-test hypothesis test analysis techniques. The results of this study indicate that the Problem Based Learning (PBL) model assisted by education games learning media has a significant effect on motivation in grade IV elementary school students. The Problem Based Learning (PBL) model assisted by education games learning media has a significant effect on critical thinking skills in grade IV elementary school students.

Keywords: Problem Based Learning Model, Education Game, Learning Motivation, Critical thinking skill, Mathematics

PRELIMINARY

Learning motivation is one of the keys for students to be ready to receive the material given by the teacher. However, when students' learning motivation is low, the ability to receive material becomes low and is directly proportional to student learning outcomes. Motivation plays an important role in strengthening student learning to solve problems (Pribadi, 2017). According to (Sauri et al., 2022), the purpose of learning motivation is to encourage students to be enthusiastic about learning and achieve their learning goals. Good learning motivation can help students overcome laziness and other temptations, get good learning outcomes, and produce quality future generations. According to Save the Children data, during the Covid-19 pandemic, 646,000 schools in Indonesia were closed, affecting more than 60 million children. As a result, they are required to take part in distance learning (PJJ) online. Even sadder, after almost nine months of the pandemic, four out of ten parents, or forty percent, said that their desire to

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teach their children had decreased. (Rossa, 2020). The main cause of children losing motivation to learn 70 percent is due to boredom, too much homework, less enjoyable learning methods, and lack of interaction with teachers.

According to (Simanjuntak, 2023) various factors, both internal and external, can cause students to be unmotivated to learn. Internal factors include students' personal interests, topic perceptions, and individual learning abilities; classroom environment, parental support, and the availability of adequate learning resources. It is very important to have a deep understanding of these components if you want to make effective efforts to increase students' desire to learn. In the learning process, critical thinking skills are needed. According to (John W, 2007) critical thinking is a process of using thinking skills effectively to help someone do something, evaluate and implement decisions based on what they believe or what they do. Critical thinking skills are very important because critical thinkers are able to think logically, answer questions well, and make decisions. Thus critical thinking is important because it can help someone make the right decisions, solve problems, and become a better person.

The results of the 2012 Program for International Student Assessment (PISA) showed that Indonesia's literacy was ranked 64th out of 65 countries with a score of 382, with students only able to reach levels 1 and 2 of 6 levels of questions. The results show that Indonesian students' thinking skills are very low. However, the results of the 2020 OECD PISA study showed that Indonesian students had an average reading ability of 371, far below the OECD average of 487 (Lidiawati, 2023). Mathematics is one of the fields of study that is considered difficult, unpleasant, even scary and boring. In reality, there are still many students who have difficulty solving math problems. One of the roles of mathematics in everyday life is as a means of conveying information. The information is conveyed in mathematical language and improves systematic and critical thinking skills, while increasing creativity. Mathematics learning has many contributions in everyday life, therefore teaching mathematics to students from an early age is very necessary

Collaboration of educational game learning media in mathematics learning is carried out using a learning model that can motivate students to be active in the learning process, one of them is using the PBL model. PBL is learning that raises a problem that occurs in its environment so that students have the desire to solve it according to their

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abilities. When students follow the learning process using the PBL assisted by Education Game media, learning motivation will increase and then the critical thinking possessed by students will also be honed. Another hope is to be able to develop their mindset to maximize the use of gadgets in everyday life not only for social media, but also for learning. Using a more interesting learning model or media will help the learning process. In learning activities at SDN 1 Krebet based on observation results, teachers still use conventional methods that are centered on teachers and provide less variation in teaching. Especially in mathematics lessons, making students easily bored and not understanding the material presented by the teacher. Students are only asked to listen and record the material, so that most students find it difficult to understand, analyze, and conclude, as a result, critical thinking are low so that students have difficulty solving problems.

Based on a preliminary study in class IV of SDN 1 Krebet, it was found that less than 50% of students' scores were below the set KKM, which was 75. This means that students have low mathematical abilities. When students are faced with non-routine story problems where the problems must be solved through stages of interpretation, analysis, and evaluation, only 30% of students can work on the problems given. The rest of the students have difficulty solving mathematical problems critically. The researcher found this at SDN 1 Krebet where there were students who still found it difficult to interpret the meaning of the mathematical problems given. Students' difficulty in interpreting the meaning of the problem can be interpreted as students having difficulty in capturing/understanding the meaning of the problem. This lack of interpretive ability is what makes it difficult for students to solve mathematical problems critically. This will have an impact on students' low ability to analyze the right mathematical problems to solve problems. Students at SDN 1 Krebet have different motivations to learn because of their abilities, interests, and environment. Students seem bored and uninterested in mathematics lessons. Most students just flip through printed books and listen to what the teacher says without commenting much. In addition, teachers continue to use lecture methods without appropriate models and media, which causes students to be unmotivated to learn mathematics. Based on this description, the researcher wants to know whether there is an influence of the PBL model assisted by Education Game on motivation and Critical thinking skills in mathematics subjects for grade IV elementary school students.

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METHOD

The method in this study is a quantitative method, the design used is nonequivalent control group design. In this study there are two groups selected randomly with an experimental group and a control group. Sampling using purposive sampling and obtained class IVA as many as 23 students as the experimental class and IVB as many as 22 students as the control. The Learning Implementation Instrument uses the Learning Objective Flow (ATP) and Teaching Module with class IV material chapter 2 Fraction material. Data collection techniques through questionnaire methods and test methods with t-test hypothesis test analysis techniques.

RESULTS

1. Description of Learning Motivation Variable Data

The learning motivation variable data was obtained from the questionnaire method in the experimental class and the control class. The results of the learning motivation questionnaire in the experimental class and the control class are as follows:

Tabel 1. Results of the Mathematics Subject Learning Motivation Indicator Questionnaire

No	Indicator	Answer Options							
		SS		S		TS		STS	
		Eks.	Kontr.	Eks.	Kontr.	Eks.	Kontr.	Eks.	Kontr.
1	Always work hard and be resilient in completing tasks	35%	36%	48%	42%	16%	17%	1%	5%
2	Not easily discouraged	35%	14%	50%	43%	15%	39%	0%	5%
3	Responsible in solving problems	34%	20%	51%	36%	14%	35%	1%	8%
4	Have determination, optimism in completing learning	34%	32%	55%	33%	8%	23%	1%	11%
5	Future-oriented	48%	26%	50%	48%	2%	22%	0%	4%
Average (*mean*)		**37,6 %**	**27,0%**	**51,5%**	**40,0%**	**9,6%**	**25,9%**	**0,7%**	**7,0%**

Source: ***Primary data processed, 2024***

Based on the table, it is known that the experimental class chose the answer strongly agree/often the highest is having determination, optimism in completing learning by 55% with the answer choice agree. While the control class chose the answer strongly agree/often the highest is oriented towards the future by 48% with the answer choice agree.

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2. Critical Thinking Skill Variable Data Description

Critical thinking skill variable data was obtained from the test method in the experimental class and control class. The results of the learning test in the experimental class and control class are as follows:

Tabel 2. ***Critical thinking skill indicator mastery***

No	Indicator	Experimental Class		Control Class	
		Pre-Test	***Post-Test***	***Pre-Test***	***Post-Test***
1	Focusing questions	64%	87%	63%	73%
2	Observing and considering observation results	75%	91%	67%	89%
3	Making deductions and considering deduction results	88%	98%	68%	83%
4	Defining terms and evaluating definitions	72%	86%	65%	80%
5	Deciding on a course of action	75%	83%	67%	72%
Average (*mean*)		**74,8%**	**89,0%**	**66,0%**	**79,4%**

Source: *Primary data processed, 2024*

Based on the table, the lowest achievement of the experimental class during the pre-test on the indicator focusing on questions was 64% and the highest percentage on the indicator making deductions and considering deduction results was 88%. While the control class, the lowest achievement on the indicator focusing on questions was 63% and the highest percentage on the indicator making deductions and considering deduction results was 68%. After being given treatment, the lowest achievement of the experimental class during the post-test on the indicator deciding on an action was 83% and the highest percentage on the indicator making deductions and considering deduction results was 98%. While the control class, the lowest achievement on the indicator deciding on an action was 73% and the highest percentage on the indicator observing and considering observation results was 89%.

3. Data *Gain Score*

Gain Score is obtained from the difference in the results of the questionnaire and tests of the two classes after receiving different treatments.

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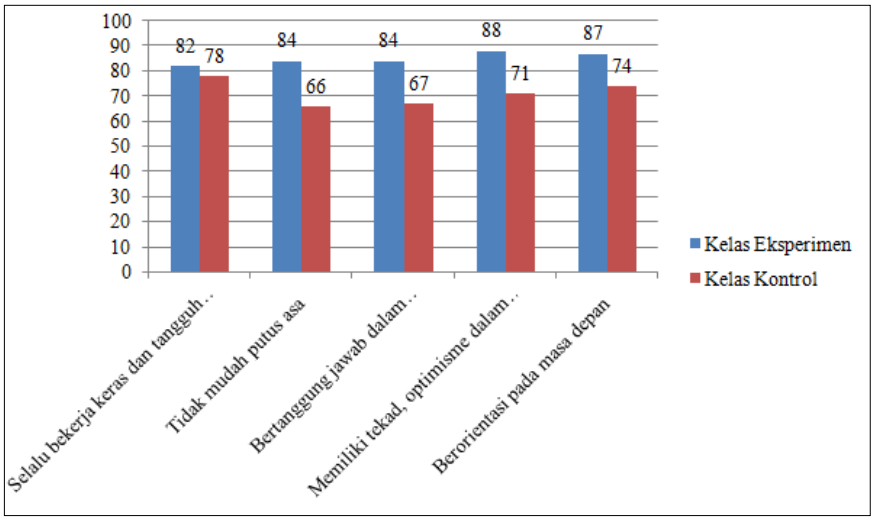

Figure 1. Motivation Gain Score
Source: Processed primary data, 2024, *2024*

There is a difference in motivation value in the mathematics subject of the experimental class and the control class. The difference in the average Gain Score value of the experimental class and the control class is 13.8. The difference between the two classes after implementing problem-based learning assisted by educational games and not giving treatment is 12.14%.

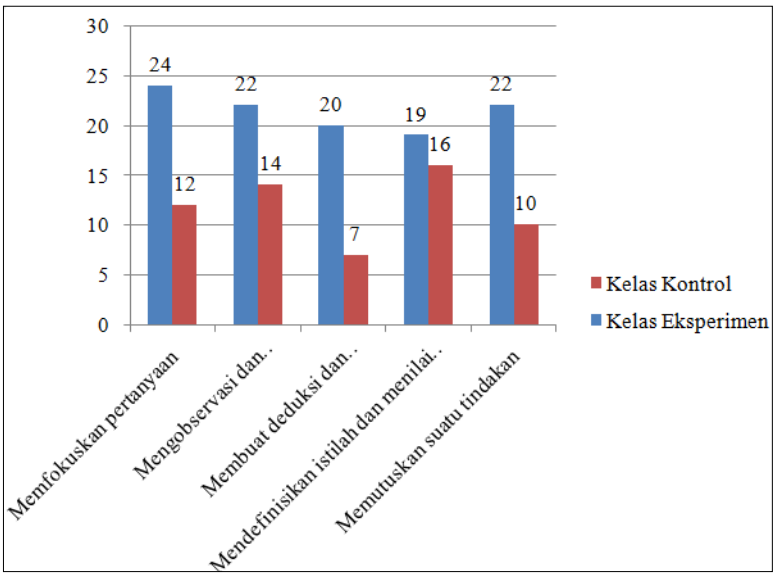

Figure 2. Gain Score Pre-Test and Post-Test Critical thinking skill
Sumber: Processed primary data 2024.

In all aspects of critical thinking skills, the experimental class is superior to the control class. This can be seen from the average Gain Score value of the experimental group's learning outcomes of 21.4. While the average Gain Score of the control group is 11.8.

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The change in the results of the critical thinking skills of the experimental class after implementing problem-based learning assisted by educational games was 19.26%, while the change in the control class was only 9.20% because it still used conventional learning.

Hypothesis Testing

The basis for making a decision to accept or reject a hypothesis tested with a t-test using SPSS is if the Sig. (2-tailed) value > 0.05 then H0 is accepted and Ha is rejected, and if the Sig. (2-tailed) value < 0.05 then H0 is rejected and Ha is accepted.

Table 3. Independent Sample T-Test

Independent Samples Test								
		Levene's Test for Equality of Variances		t-test for Equality of Means				
		F	Sig.	t	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Motivation	Equal variances assumed	,039	,164	4,710	30	,003	,813	1,144
	Equal variances not assumed			4,710	26,761	,004	,813	1,144
Critical thingking skill	Equal variances assumed	,091	,765	5,040	30	,000	13,375	2,654
	Equal variances not assumed			5,040	29,963	,000	13,375	2,654

Source: Processed primary data, 2024

It is known that the sig value (2-tailed) on the equal variances assumed on the learning motivation of the experimental class and the control class is 0.003 <0.05, it can be concluded that there is a significant difference between the learning motivation of the experimental class and the control class. So that the use of the PBL model assisted by education games has a significant effect on the learning motivation of grade IV elementary school students. The sig value (2-tailed) on the equal variances assumed on the critical thinking skills of the experimental class and the control class is 0.000 <0.05, it can be concluded that there is a significant difference between the critical thinking skills of the experimental class and the control class. So that the use of the PBL model assisted by education games has a significant effect on the critical thinking skills of grade IV elementary school students.

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DISCUSSION

The Influence of the PBL Model Assisted by Education Games on Learning Motivation in Mathematics Subjects

Based on the results of the study, the learning motivation in mathematics subjects of grade IV elementary school students showed differences in the experimental and control classes. The PBL model assisted by educational games motivates students more in mathematics subjects than conventional learning models. Piaget's constructivism theory which is based on cognitive theory holds that learning is an activity of building knowledge carried out by students themselves based on experience. According to this theory, learning models such as the Problem Based Learning (PBL) Model motivate students to be active in learning (Rifa'i et al., 2022). Based on the results of the study, it is known that the learning interest of students who use the Problem Based Learning (PBL) Model is better than learning that only uses conventional models. This can also be seen during the learning process in the experimental class, students are more enthusiastic in learning, enthusiastic in receiving learning. According to (Rusmono, 2014), the emergence of student motivation in learning through PBL because students can feel the benefits of learning through problems faced by children associated with real life. So that through authentic experiences, it can encourage students to learn actively, construct knowledge and integrate the context of learning at school and learning in real life naturally.

As for the learning process in the control class, some students do not pay attention to the lesson material when working on a lesson, students are busy with their own affairs. So it is not surprising that if the teacher gives the material, there are still many students who are confused because the students are not active in mastering the material. In addition, students say they understand when in fact the students do not understand so that when the teacher gives a question only a few students are able to answer correctly. This causes low student learning motivation and greatly affects student learning outcomes. Based on the hypothesis test, the use of the PBL model assisted by educational games has a significant effect on the learning motivation of grade IV elementary school students. As stated by (Warsono & Hariyanto, 2012) that PBL can increase student learning motivation because this learning utilizes the effects of curiosity, challenges, authentic tasks, and involvement in learning. In addition (Sugiyanto, 2010) stated that working together in

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solving problems can provide motivation to be involved in tasks and increase opportunities for joint investigation and dialogue so that it can develop thinking and social skills.

Problem based learning (PBL) is a learning activity that does not only expect students to listen, take notes, then memorize learning materials, but must actively think, communicate, search for and process data, and finally conclude. Learning activities must be directed to solving problems. Problem based learning (PBL) places problems as the focus of learning, without problems the learning process is impossible. By placing these problems, it can affect students' learning motivation. Integration with education games where games or games are methods that are the embodiment of a fun and exciting learning process (Pribadi, 2017). The benefits obtained are not only happy, happy, and comfortable but can also gain knowledge or learn lesson materials while playing. According to (Ferreira et al., 2016) learning in the form of games is a way of learning for students that has been used for a long time, so using games as a learning medium has many benefits. The results of previous research conducted by (Hartatik, 2023) showed differences in student motivation in the classroom when learning uses the PBL model treatment. (Puspitasari et al., 2023) the application of the PBL learning model with game media has an effect on students who are less active in the learning process.

The Influence of the PBL Model Assisted by Educational Games on Critical Thinking Skills in Mathematics Subjects

Based on the results of the study, critical thinking skills in mathematics subjects for grade IV elementary school students showed differences between the experimental and control classes. With the highest percentage of the experimental class on the indicator of making deductions and considering the results of deductions of 98%. While the highest percentage of the control class on the indicator of observing and considering the results of observations of 89%. This shows that there is a difference in the value of critical thinking skills between the experimental class and the control class. (Warsono & Hariyanto, 2012) stated that the advantages of the Problem Based Learning (PBL) Model on learning outcomes have a good transfer effect. Based on the presentation and analysis of the data, the average post-test value of critical thinking skills for students in the experimental class is greater than the control class. So it can be concluded that the average

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post-test value of the results of the critical thinking skills of the experiment is higher than the average post-test value of critical thinking skills for students in the control class. Thus it can be said that by implementing this PBL, students can improve their critical thinking.

In theory, according to (Rusmono, 2014) Problem based learning is a learning model that provides authentic experiences that encourage students to learn actively, construct knowledge and integrate the context of learning at school and learning in real life naturally. So that it provides conditions to improve critical thinking and analysis skills and solve complex problems in real life so that it will create a culture of thinking in students as well as their learning outcomes. Learning in the control group is by using a direct learning model. This learning is carried out using lecture, assignment, and question and answer methods. Students are asked to listen to the teacher's explanation and take notes on what the teacher says. When the teacher delivers the material, some students do not pay attention and seem busy talking to friends, some are playing. After the teacher explains the material, students are asked to work on practice questions related to the material that has been given. Some students have difficulty doing the assignments given by the teacher.

Based on the hypothesis test, the use of the PBL model assisted by education games has a significant effect on the critical thinking skills of grade IV elementary school students. Learning using the PBL model can improve students' skills in asking questions, as well as describing various problems. In line with that (Amir, 2010) explains that the purpose of the PBL model is to increase a person's capacity to ask questions, make them more involved in group learning, teach them how to develop problem-solving plans (either by discussing them openly or privately), and teach them how to find information relevant to the subject matter. Supported by education game media where game-based learning media is very effective for use in learning because it has benefits such as providing pleasure and also learning continues as it should but is more efficient. Game-based learning media is a media with a game that is useful for supporting a sense of happiness and can improve thinking skills in problem solving. Research (Monalisa et al., 2019) students experienced an increase, namely to 80.8 percent of critical thinking skills. The increase that occurred also proves that PBL can make learning in the field of mathematics more effective and efficient in improving critical thinking skills according to research (Rifai, 2020).

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CONCLUSION

The results of this study indicate that the problem based learning (PBL) model assisted by educational games learning media has a significant effect on motivation in grade IV elementary school students. This means that if Problem Based Learning (PBL) is implemented properly and correctly, the motivation of grade IV elementary school students will increase. The Problem Based Learning (PBL) model assisted by educational games learning media has a significant effect on critical thinking skills in grade IV elementary school students. This means that if Problem Based Learning (PBL) is implemented properly and correctly, the critical thinking skills of grade IV elementary school students will increase. Based on the conclusion, the suggestion that can be put forward by the researcher is that teachers should be able to increase students' learning motivation to always be optimistic. Teachers should be creative in training students to improve their ability to make questions, so that students' scores in making questions on critical thinking skills increase. In addition, teachers should enrich students' basic knowledge through reading corners or libraries related to the material being discussed or the questions being discussed so that students have broad knowledge. For other studies, conducting experiments on different and broader materials is not just one material, namely CP fractional numbers, material comparing, ordering and recognizing equivalent fractions.

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