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The Influence of Problem Based Learning Model on Students' Interest in Learning and Creative Thinking Skills in Mathematics Subjects in Elementary Schools

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Abstract: This study aims to investigate the effect of the Problem Based Learning (PBL) learning model on students' learning interest and creative thinking skills in mathematics subjects in elementary schools. The research design used was a quasi-experiment with two groups: class IIIA as the control group (n = 20) and class IIIB as the experimental group (n = 19). Data collection was carried out during the period from May 13 to June 7, 2024 through questionnaires and tests. Data analysis involved normality tests, homogeneity tests, and Mann-Whitney tests to test differences between the two groups. The results of the analysis showed that the implementation of PBL significantly increased students' learning interest (p = 0.000) and creative thinking skills (p = 0.000) compared to conventional learning methods. These findings indicate that the PBL model is an effective strategy to improve the quality of mathematics learning in elementary schools. The implications of this study are that PBL can be used as a basis for curriculum development and teacher training, which aims to design more interactive, relevant, and contextual learning for students.
Keywords: Problem Based Learning; Learning Interest; Creative Thinking Ability.

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1. INTRODUCTION

Education in Indonesia is a very important aspect in determining the quality of human resources that will shape the future of the nation (Purwananti, 2016). In an effort to improve the quality of learning at the elementary level, SDN 009 Bukit Lembah Subur has a strategic role as an educational institution that must continue to innovate to create an optimal learning environment. Especially for increasing interest in learning and creative thinking in students.

Interest in learning in students is an internal drive that encourages them to be actively involved in the learning process (Suprihatin, 2015). This motivation includes interest, desire, and determination to achieve learning goals. In the context of education, interest in learning has an

important role because it can influence the level of participation, concentration, and effort that students invest in learning. Interest in learning is a psychological condition that motivates individuals to carry out learning activities voluntarily and continuously (Matondang, 2018). Conceptually, interest in learning can be interpreted as an individual's affective response to a material or learning activity that shows interest, desire, and motivation to follow the learning process (Rahmayanti, 2016). In the context of education, interest in learning is an important factor that influences students' learning success in school (Pratiwi, 2017).

According to (Pratiwi, 2017) learning interest consists of two main dimensions, namely situational interest and dispositional interest. Situational interest relates to students' interest in a particular topic or learning material being studied in class. Meanwhile, dispositional interest refers to a more general interest in a field or subject of learning as a whole. These two dimensions of learning interest influence each other and can interact in the context of learning.

In the context of this research, understanding the concept and concept of learning interest is important because it will help in evaluating the extent to which the PBL Learning model can influence students' learning interest in mathematics subjects. With a deep understanding of learning interest, researchers can design more effective learning strategies in increasing student motivation and involvement in the learning process. Some important indicators of learning interest that are often observed in the context of educational research are; 1) active participation in learning 2) interest in learning materials 3) initiative in seeking additional information 4) persistence and consistency in learning.

On the other hand, critical thinking skills are cognitive skills that involve evaluation, analysis, and synthesis of information (Rosnawati, 2012). Students who have creative thinking skills can solve complex problems, develop logical thinking, and make informed decisions. These two aspects are interrelated, where high learning interest can trigger the development of critical thinking skills. Conversely, good creative thinking skills can increase students' self-confidence and, as a result, strengthen their motivation in achieving Learning goals. Therefore, a deep understanding of the relationship between learning interest and creative thinking skills in students is essential to improving the effectiveness of education at the elementary level.

Creative thinking ability is a person's capacity to generate new and original ideas and find innovative solutions to problems or challenges faced (Saragi, 2020). This ability involves a divergent thinking process, where a person can see various possibilities and different perspectives before reaching one or more solutions. Creative thinking often involves thinking outside conventional

boundaries and not being afraid to take risks or make mistakes in the process (Supardi, 2015). Creative thinking ability is not only about producing something new but also about seeing connections between seemingly unrelated things and developing ideas that can be applied in various contexts.

The main components of creative thinking skills include fluency, flexibility, originality, and elaboration. Fluency is the ability to generate many ideas; a creative person does not stop at one or two ideas but continues to generate more possible solutions. Flexibility is the ability to move from one idea to another, to look at a problem from different angles, and to adapt different approaches according to the situation. Originality is the ability to generate unique and unusual ideas, something that has never been thought of before. Meanwhile, elaboration is the ability to develop ideas in detail, enriching the basic idea with details and practical implementations.

Education that encourages creative thinking helps students develop real-life skills, such as adaptability, innovation, and complex problem solving. Creative thinking is also closely related to innovation, which is a key driver of technological and economic progress. Innovation in fields ranging from technology to the arts is often the result of strong creative thinking skills.

Developing creative thinking skills from an early age can provide long-term benefits for individuals in various aspects of life, including academic, career, and personal life. In the workplace, creative thinking skills enable a person to adapt quickly to change, create new solutions to existing problems, and contribute to the development of new products or services. In personal life, creative thinking skills can improve a person's ability to face everyday challenges, find new ways to express themselves, and improve the overall quality of life. Therefore, it is important for educators and parents to create an environment that supports the development of creative thinking skills. This can be done through teaching methods that encourage exploration, experimentation, and collaboration, and provide space for students to think freely and try new things without fear of failure. Thus, we can equip the next generation with the skills needed to face future challenges and opportunities, and encourage them to become creative innovators and leaders. The following are indicators of creative thinking skills based on research conducted by Andiyana et al. (2018); 1) Fluency 2) Flexibility 3) Originality 4) Elaboration.

After the researcher conducted observations, various problems were found that could affect the quality of learning. One of the main challenges faced was the lack of student focus during the learning process, which directly affected the level of understanding of the material presented. In addition, children's memory seemed less than optimal, indicating potential obstacles in the retention

of information provided during learning. Furthermore, it was seen that children showed a low level of motivation in carrying out the teaching and learning process, possibly caused by boredom due to the use of monotonous learning methods.

This finding highlights the need for serious efforts to address these shortcomings in the Learning approach. The monotonous phenomenon in the Learning process is one of the key factors that causes lack of focus, decreased memory, and lack of student motivation. Therefore, teachers are required to be more innovative in designing and implementing Learning. This innovation includes the use of more varied Learning methods, the use of educational technology, and creativity in compiling Learning materials that attract students' attention. By introducing fresh and different approaches, it is expected to create a more dynamic Learning atmosphere, stimulate students' memory, and increase their level of motivation in following each phase of the teaching and learning process. As a result, this effort is expected to optimize Learning achievements and provide a positive impact on the academic and non-academic development of students in the Learning environment.

One of the learning models that is increasingly gaining attention is Problem-Based Learning (PBL), which emphasizes problem-based learning and active student participation. Problem-Based Learning (PBL) is a learning approach that emphasizes solving real problems as the main foundation of the learning process (Mayasari et al., 2016). In PBL, students are given complex problems or challenges that require in-depth analysis, teamwork, and creative solutions. Students are expected to actively seek information, identify problems, and develop solutions, thus developing creative thinking, collaboration, and problem-solving skills. PBL creates contextual learning experiences, motivates students, and connects learning to real-world contexts, preparing them to face the demands of life and future careers.

Problem-Based Learning (PBL) Model is a learning approach that emphasizes giving students real problems or situations as a starting point in the learning process. In PBL, students are encouraged to be active in finding solutions to these problems by exploring various relevant resources and information. As stated by Barrows, "PBL is a student-centered pedagogy in which students learn about a subject through the experience of solving an open-ended problem found in trigger material" (Anggraeni et al., 2018). In other words, in PBL, students not only act as recipients of information, but also as problem-solvers, which process encourages them to develop creative thinking skills, collaboration, and independence in learning.

One of the main characteristics of the PBL Learning Model is that the Learning process begins with the presentation of a problem or challenge that stimulates students to understand certain

concepts (Hotimah, 2020). According to Savery and Duffy (1996), PBL has the characteristic that "the problem drives the learning process". In this context, the problem given is considered the center of Learning, which is the focal point for problem-solving efforts and concept exploration (Uswati, 2016).

In PBL, the teacher's role is more oriented towards being a facilitator or guide rather than as the main source of knowledge. This is in line with Howard Barrows' opinion which states that, "The tutor's role in problem-based learning is not primarily to teach but to help the student learn" (Barrows, 1986). In this role, the teacher plays a role in providing direction, guidance, and support to students in exploring problems, developing problem-solving strategies, and linking learning concepts to the context of the problems faced.

In addition, PBL also emphasizes collaborative learning between students. In this context, collaboration does not only occur between students and teachers, but also between fellow students in work groups. According to Hmelo-Silver (2004) in a study by Anugraheni (2018), "Collaboration is an important component of PBL. Students need to be involved in discussions to define problems, identify what they know, what they need to know, and how they will find answers to the problem." With cooperation between students, it is hoped that there will be productive interactions and more effective problem solving through sharing ideas, knowledge, and experiences.

This study focuses on the influence of the PBL Learning Model on the learning interest and creative thinking skills of grade III students at SDN 009 Bukit Lembah Subur. Learning interest is the main key in determining the level of student participation in the learning process, while creative thinking skills are the foundation for developing analytical and reflective thinking at the elementary level. Therefore, a deep understanding of the impact of using the PBL Learning Model is expected to provide a positive contribution to improving the quality of education at the elementary level.

In the context of SDN 009 Bukit Lembah Subur, understanding the influence of PBL on learning interest and creative thinking skills of grade III students is very relevant and essential. Through this study, it is expected to find empirical evidence that can be a basis for schools and other education stakeholders in developing more effective and relevant learning policies to the development needs of children in the era of technological and information development.

By looking at the important role of SDN 009 Bukit Lembah Subur in producing the next generation of the nation, this study is expected to provide a significant contribution in supporting efforts to improve the quality of learning at the elementary level, especially in terms of learning interest and creative thinking skills of grade III students. Through a deep understanding of the

influence of the PBL Learning Model, new insights can be opened regarding learning methods that can trigger student activity and advance their creative thinking skills.

2. METHOD

This study uses a quantitative approach with a quasi-experimental design, which emphasizes the collection and analysis of numerical and statistical data to answer research questions. The quasi-experimental design was chosen because it allows researchers to observe the effects of a treatment on other variables without full control over all variables involved. With this approach, research can combine the advantages of quantitative analysis with the flexibility of quasi-experiments to explore relationships between variables in more depth.

Furthermore, the population of this study included elementary school students studying Mathematics, consisting of two classes: class IIIA with 20 students and class IIIB with 19 students, so that the total population was 39 students. The sample in this study was taken from the entire population, with class IIIB as the experimental class and class IIIA as the control class. The selection of samples was carried out carefully to ensure proper representation of the population, so that the results of the study can provide an accurate picture.

The instruments developed in this study include a creative thinking ability test and a learning interest questionnaire. The development of the creative thinking test begins with identifying relevant aspects, such as analytical, evaluation, inference, and problem-solving abilities. Once these aspects are determined, appropriate questions are designed to measure each aspect. The test is then piloted to ensure its clarity and consistency through validity and reliability tests. In the learning interest questionnaire, similar steps are taken by identifying learning interest factors and formulating questions that can reveal the respondent's level of interest as a whole. Like the test, this questionnaire is also tested for validity and reliability to ensure that the data produced is reliable.

The research procedure begins with problem formulation, namely identifying the topic to be researched through a literature review to determine clear research questions. After that, the research design is designed including research methods, population and samples, and relevant data collection techniques. Data are then collected according to the established method, either through surveys, observations, or experiments. Finally, data analysis and interpretation are carried out using appropriate statistical techniques, such as descriptive statistics or hypothesis testing, to answer the research questions and provide meaningful implications.

In data analysis, normality test is performed to test whether the data follows a normal distribution, which is important for determining the appropriate statistical analysis method. If the data

is normally distributed, parametric statistical analysis such as t-test or ANOVA can be performed. If not, non-parametric methods may be more appropriate. In addition, homogeneity test is needed to ensure that the variance between groups is uniform, which is a prerequisite in comparative analysis. If the variance is homogeneous, analysis can be performed using t-test or ANOVA; otherwise, Welch or Kruskal-Wallis test is considered.

Finally, hypothesis testing aims to test the truth of the research hypothesis. By determining the level of significance and using appropriate statistical methods, researchers check whether the null hypothesis (no significant difference) can be accepted or rejected. In this study, the t-test is used to test the proposed hypothesis, so that the results can provide conclusions regarding the effect of independent variables on dependent variables.

3. RESULTS AND DISCUSSION

This study used a quasi-experimental design with two sample groups, namely class IIIA as the control group consisting of 20 students and class IIIB as the experimental group consisting of 19 students. The study was conducted from May 13 to June 7, 2024. In the control group, learning was carried out using conventional methods, while in the experimental group the Problem Based Learning (PBL) Learning model was applied. Data collection was carried out through questionnaires to measure learning interest and tests to assess students' creative thinking abilities. The pretest conducted on May 13, 2024, showed that the majority of students from both groups were in the category of moderate learning interest and incomplete creative thinking ability (TT). The average pretest score for learning interest in the experimental class was 64.68, while in the control class it was 60.30. In terms of creative thinking ability, the experimental class obtained an average of 61.68, while the control class 55.65, both in the incomplete category. After going through a four-week learning period using the PBL model in the experimental group, a posttest was conducted on June 7, 2024 to evaluate the effectiveness of the PBL method compared to the conventional method. The posttest results showed a significant increase in students' learning interest and creative thinking skills in the experimental class with an average learning interest score of 84.63 and creative thinking skills of 82, while in the control class, the average learning interest only reached 63.05 and creative thinking skills of 61.35. These results indicate that the PBL model is more effective in increasing students' learning interest and creative thinking skills than conventional methods.

In this study, two types of analysis requirements tests were conducted, namely the normality test and the homogeneity test. The normality test aims to determine whether the data is normally distributed, while the homogeneity test is conducted to determine whether the variance of the two groups (experimental and control) is the same or not. The results of these two tests will determine the type of statistical analysis that is appropriate to use in further data processing. The normality test using Shapiro-Wilk shows that all pretest and posttest variables for learning interest and creative thinking skills in the experimental and control classes have a p-value greater than 0.05, so the data is normally distributed and the normality assumption is met. However, the homogeneity test using Levene's Test shows that all variables have a p-value less than 0.05, which means that the variance of the two groups (experimental and control) is not homogeneous. This condition indicates that the homogeneity assumption is not met, so it is necessary to consider the use of appropriate alternative statistical tests.

After conducting the analysis requirement test and finding that the homogeneity assumption was not met, this study used the Mann-Whitney test for hypothesis testing. The Mann-Whitney test is a non-parametric alternative to the independent t-test that does not require homogeneity of variance and normality of data distribution. This test was conducted to evaluate the differences between the experimental class using the Problem Based Learning (PBL) model and the control class using conventional methods, both in terms of students' learning interest and creative thinking skills. The results of the Mann-Whitney test are presented in two tables that include pretest and posttest data for both variables.

Table 1. Mann-Whitney Test of Learning Interest

	Pretest of Learning Interest	Posttest Learning Interest
Mann-Whitney U	76.000	.000
Wilcoxon W	286.000	210.000
Z	-3.219	-5.354
Asymp. Sig. (2-tailed)	.001	.000
Exact Sig. [2*(1-tailed Sig.)]	.001[b]	.000[b]
a. Grouping Variable: Kelas		
b. Not corrected for ties.		

Table 1 The Mann-Whitney Test of Learning Interest shows significant results. For the pretest of learning interest, the Asymp. Sig. (2-tailed) value is 0.001, which is smaller than 0.05, indicating a significant difference between the experimental and control classes before treatment. In the posttest of learning interest, the Asymp. Sig. (2-tailed) value is 0.000, which is also smaller than 0.05, indicating a very significant difference between the two classes after

treatment. The decrease in the Mann-Whitney U value from 76.000 in the pretest to 0.000 in the posttest indicates that the difference between the two classes becomes greater after the implementation of the PBL model, with the experimental class showing a higher increase in learning interest compared to the control class.

Table 2. Mann-Whitney Test of Creative Thinking Ability

	Creative Thinking Ability Pretest	Posttest of Creative Thinking Ability
Mann-Whitney U	37.000	.000
Wilcoxon W	247.000	210.000
Z	-4.329	-5.355
Asymp. Sig. (2-tailed)	.000	.000
Exact Sig. [2*(1-tailed Sig.)]	.000[b]	.000[b]
a. Grouping Variable: Kelas		
b. Not corrected for ties.		

Table 2 Mann-Whitney Test of Creative Thinking Ability also shows significant results. For both pretest and posttest of creative thinking ability, the Asymp. Sig. (2-tailed) value is 0.000, which is smaller than 0.05. This indicates a significant difference between the experimental and control classes, both before and after the treatment. The decrease in the Mann-Whitney U value from 37.000 in the pretest to 0.000 in the posttest indicates that the difference between the two classes became greater after the implementation of the PBL model. This shows that the PBL model has a significant positive impact on improving students' creative thinking ability compared to conventional methods.

4. CONCLUSION

Based on data analysis from research on the influence of the Problem Based Learning (PBL) learning model on learning interest and creative thinking skills in grade III students at SDN 009 Bukit Lembah Subur, it can be concluded that the PBL model has a significant influence on increasing students' learning interest in mathematics subjects. A significant difference was seen between the experimental class using the PBL model and the control class using conventional methods. In addition, the PBL model also showed a significant influence on increasing students' creative thinking skills, where students who learned with the PBL model showed higher creative thinking skills than students who learned with conventional methods. Overall, PBL has proven effective in creating a learning environment that supports active engagement, stimulates critical and creative thinking, and increases the relevance of mathematics learning to students' daily lives.

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