OPEN ACCESS

Jurnal Riset Pendidikan MIPA, 10(1): 37-46, June 2026
ISSN 2549-0192 (e) | 2549-0184 (p)
http://new.jurnal.untad.ac.id/index.php/jrpm/

Implementation of Project Based Learning Model to Enhance Science Creativity and Critical Thinking Skills of Students on Ecosystem Material in Primary School

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Article History
Received 17 March 2026
Revised 23 April 2026
Accepted 26 May 2026

Keywords:
PjBL, Science Creativity, Critical Thinking Skills.

Abstract

This research aims to determine the influence of implementing the Project Based Learning (PjBL) model in enhancing science creativity and critical thinking skills on the ecosystem material among fifth-grade students at SD Inpres Malei. The research sample consisted of 22 fifth-grade students enrolled in the academic year 2022/2023. The research method employed a quasi-experimental design with a one-group pretest-posttest design. Data collection involved observations and learning outcome tests. Data analysis utilized SPSS 23, involving tests for normality, homogeneity, and incidental sample T-test. The findings revealed that the pretest average scores for science creativity and critical thinking skills were 59.09 and 49.32, respectively. In the posttest, the average scores increased to 85.45 for science creativity and 79.09 for critical thinking skills. The mean differences between pretest and posttest demonstrated an improvement in learning outcomes. The average improvement for science creativity was 26.36, while for critical thinking skills, it was 29.77. The SPSS output yielded significance values lower than the significance level of 0.05 (0.000 < 0.005), rejecting H0 and accepting H1, indicating a positive influence of the Project Based Learning model in enhancing science creativity and critical thinking skills on the ecosystem material among fifth-grade students at SD Inpres Malei.

doi: 10.22487/j25490192.2026.v10.i1.pp.37-46

Introduction

Education is an important aspect for realizing an advanced and prosperous human life. This is because prosperity is no longer based on natural resources and physical capital, but also on intellectual and social capital. The education system currently used is the Merdeka Belajar curriculum as a follow-up to improvements to the 2013 curriculum which is expected to be able to transform education into a superior one that has the profile of Pancasila Students who are active, creative and create critical thinking processes and are able to keep up with current developments. Understanding Freedom of Learning is an activity to liberate educational institutions and encourage students to innovate and have creative thinking through differentiated learning.

Science learning becomes an interesting thing to learn if it is linked to the critical thinking process. Elementary school level science learning studies the arrangement of events, facts, concepts related to nature. Science learning equips students with various scientific disciplines and develops thinking power (Pamungkas *et al.*, 2019). Furthermore, science learning provides opportunities for students to investigate phenomena, explore problems, and develop critical thinking skills through active learning processes (Kause & Paut, 2024). Suitable for use in thematic learning on ecosystem themes, because students can easily find ecosystem activities in their environment, making it easier for students to build knowledge and solve problems on ecosystem themes through the steps in the project-based learning model. When science learning is predominantly delivered through lectures, students may have limited opportunities to engage in higher-order thinking and meaningful interaction. When science learning is predominantly conducted through lectures, students may have limited opportunities to engage in higher-order thinking and meaningful interaction. Science learning should therefore provide opportunities for students to analyze, evaluate, and apply knowledge rather than merely receive information, as higher-order thinking skills are essential to the development of students' critical thinking abilities (Tulljanah & Amini, 2021; Sidiq et al., 2021). Ideal learning does not only focus on grades or student work results but on how students proceed to find common ground or answers to the problems they face. Science learning itself is learning that is related to students' lives and

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the environment around them. In other words, ideal science learning, especially ecosystem material, is learning that students can learn directly in order to develop critical thinking skills so that students can find answers through their learning experiences. Critical thinking is an essential competency that needs to be developed and continuously trained through learning activities. This ability enables students to understand learning materials, analyze and evaluate information, and solve problems effectively, making it important not only in the learning process but also in various aspects of everyday life (Kusuma et al., 2024; Hafifah et al., 2024).

Based on the results of observations in elementary schools, currently the learning process still uses conventional learning models such as lectures and assignments. So the learning process is monotonous and students are less able to explore their existing abilities. Apart from that, the use of learning media is still very rare. This shows that the learning process used has not been able to accommodate and facilitate all the learning abilities of each student who are different from each other. There needs to be improvements and creativity so that learning can be more attractive to students as the main subject of learning and develop students' critical thinking skills. The choice of learning model in the learning process also influences the success of achieving goals. The use of PjBL (*Project Based Learning*) or project-based learning model is one option to facilitate understanding of the subject matter being discussed because it provides direct practice, not just abstract, so that if they encounter problems in learning, students are able to analyze the problem, provide critical responses to the problem. , and find solutions and make it easier for teachers to provide learning experiences to students.

Science learning is synonymous with natural and artificial resources so that developing a PJBL learning model can utilize items around students as materials for making projects. The application of the PJBL learning model has several advantages, namely: a) increasing students' learning motivation, b) training students' self-confidence, c) training collaboration between students, d) students becoming more active in learning activities, e) forming students to be able to (Monica et al., 2021). In implementing the PjBL learning model, there are steps that differentiate it from other learning models, namely: 1) determining basic questions related to the material, 2) designing the project, 3) planning the project creation schedule, 4) monitoring project progress, 5) project assessment, 6) evaluation of project creation experience (Sagala et al., 2021).

In all the explanations above regarding the PJBL model, the researcher believes that the application of this model can be used to improve students' ability to think critically. Kusumaningrum & Djukri (2016) explains that the application of project-based learning is a suitable model to meet educational goals in the 21st century, because it involves the 4C principles, namely: critical thinking, collaboration, creativity and communication. Therefore, this research is important because it is an effort made to improve critical thinking skills.

Materials and Method

This research was carried out at SD Inpres Malei, Batuoge village, Pasangkayu Regency , in the even semester 2022/2023. The population in this study were students at SD Inpres Malei, Batuoge village, Pasangkayu Regency, academic year 2022/2023. Based on the characteristics of the population, sampling was carried out using an *incidental sampling technique* . *incidental sampling* is sampling technique based on chance, that is, anyone who meets the researcher by chance can be used as a sample, if it is deemed that the person they meet by chance is suitable as a data source. The sample from this research was class V of SD Inpres Malei, totaling 22 students. (male =13; female = 9)

Research design

The research design used was *a one group pre test-post test design* , namely experimental research carried out on only one group that was chosen at random and no tests were carried out for the stability and clarity of the group's condition before being given treatment. This *one group pre test and post test* research design was measured using *a pre test* which was carried out before being given treatment and *a post test* which was carried out after being given treatment for each learning series. In this way, the results of the treatment can be known more accurately. To eliminate bias from the research results, a *pre-test* and *post-test* will be carried out in each learning series.

Research procedure

This research procedure consists of three stages, namely the preparation stage, implementation stage and final stage.

1) Preparation phase

The activities carried out are as follows: a. Look for literature related to the research title which includes theoretical studies of the *Project Based Learning learning model* , b. Determine location, c. Determine the research population and sample, d. Develop learning tools and research instruments, e. Conduct validity tests.

2) Implementation Stage

Activities carried out at the implementation stage are as follows: a. Conduct *a pretest* using questions about scientific creativity and critical thinking skills to determine students' initial abilities regarding learning outcomes according to the material being taught., b. Applying the *Project Based Learning learning model* in accordance with the planned RPP, c. In the teaching and learning process, observations are made of teachers and students during the learning process which is carried out by *observers* . Observations on students to measure the implementation of the *Project Based Learning* learning model carried out by the teacher and observing student activities in participating in learning by filling in the observation sheet provided by the teacher, d. Provide *a posttest* to determine the level of scientific creativity and critical thinking skills

of students after receiving treatment.

3) Final Stage

Carry out data analysis for normality tests, homogeneity tests, scientific creativity values, critical thinking values and hypothesis testing. The final stage of data analysis is analyzing and discussing the results of research findings which are used to draw conclusions in accordance with the research objectives.

The instruments used in this research include:

1) Learning Media

The learning tools used during the research included research scenarios, Learning Implementation Plans (RPP), Student Worksheets (LKPD) and observation sheets.

2) Science Creativity Test

Science Creativity Test, preparing a test by preparing a grid instrument that includes basic competencies, indicators, measured indicators and their assessment.

3) Critical Thinking Test

Critical Thinking Test, preparation of tests with the preparation of grid instruments that include basic competencies, indicators, measured indicators and their assessments.

4) Observation sheet

This observation sheet is used to measure students' scientific creativity and critical thinking. Data from the collected sheets is then analyzed and grouped according to predetermined categories. Observation sheets are also used to observe or view teacher and student activities during the learning process.

This research consists of two variables, namely the independent variable and the dependent variable. The independent variable is the *Project Based Learning learning model* while the dependent variable is scientific creativity and critical thinking skills. The variables in this research are:

1) *Independent* variable (X_1): *Project Based Learning* learning model
2) Dependent variable (Y_1) : Scientific Creativity
3) Dependent variable (Y_2) : Critical Thinking Skills

Analysis of learning implementation data through observation sheets. Attached to the Learning Implementation Plan (RPP).

1. Normality test

The normality test is used to determine whether the pretest and posttest scores are normally distributed or not. To test normality, the data used are pre-test scores for scientific creativity and critical thinking skills as well as post-test scores for scientific creativity and critical thinking skills using the *one group pre-test and post-design normality test* with SPSS 23.

2. Homogeneity Test

The Homogeneity Test is carried out to see whether the data obtained from the pretest and posttest taken from learning outcome data is homogeneous or not homogeneous. So homogeneity testing on a sample taken can be carried out with *a one group pretest and posttest design homogeneity test* using SPSS 23.

3. Hypothesis testing

Hypothesis truth testing can be done using the parametric statistical test t-test to see data that is normally distributed and homogeneous. If the data is normally distributed but not homogeneous, it is necessary to carry out a non-parametric test using SPSS 23.

Results and Discussion

Analysis of research data using the SPSS 23 application. The research data found is as follows.

1. Statistic test

To analyze the research data, statistical tests were used using the SPSS 23 test. In this test, a *Paired Sample T normality test was carried out* , a homogeneity test was carried out and finally a Hypothesis test was carried out. The description of the statistical test data in this research is:

Table 1. Description of Statistical Tests

	N	Range	Minimum	Maximum	Mean	Std. Deviation	Variance
Science Creativity Pretest	22	20	45	65	59.09	6,294	39,610
Science Creativity Posttest	22	20	75	95	85.45	6,345	40,260
Critical Thinking Skills Pretest	22	20	40	60	49.32	5,834	34,037
Critical Thinking Skills Posttest	22	20	70	90	79.09	5,485	30,087
Valid N (listwise)	22						

2. Normality Test Results

The normality test aims to test whether the pretest data and posttest data for scientific

creativity and critical thinking skills of fifth grade students at SD Inpres Malei after implementing the PjBL learning model are normally distributed.

The results of the data normality test are as follows.

Table 2. Normality Test Results

Tests of Normality

		Kolmogorov-Smirnov [a]			Shapiro-Wilk		
	Test Results	Statistics	df	Sig.	Statistics	df	Sig.
Student scores	1	,285	22	,000	,816	22	,001
	2	,218	22	,008	,878	22	.011
	3	,228	22	,004	,896	22	,025
	4	,202	22	,020	,920	22	,077

a. Lilliefors Significance Correction

Note:

Student scores

1: Science creativity pretest

2: Science creativity posttest

3: Critical thinking skills pretest

4: Critical thinking skills posttest

The basis for making data normality test decisions is:

1. If the significance value (sig.) **<0.05** then the data is normally distributed
2. If the significance value (sig.) **> 0.05** then the data is normally distributed

Based on the data on the output of the normality test results using Kolmogorov-Smirnov and Shapiro-Wilk, the level of significance is the pretest value of scientific creativity (0.00), the posttest value of scientific creativity (0.008), the pretest value of critical thinking skills (0.004), the posttest value of critical thinking skills (0.020). From this data it can be concluded that the data from the pretest and posttest results for scientific creativity and critical thinking skills are normally distributed.

3. Homogeneity Test Results

The homogeneity test aims to test whether the data on the distribution of scientific creativity scores and critical thinking skills of fifth grade students at SD Inpres Malei after the implementation of the PjBL learning model is homogeneous. The homogeneity test results are as follows.

Table 3. Homogeneity Test Results

		Levene Statistics	df1	df2	Sig.
Student scores	Based on Mean	,193	3	84	,901
	Based on Median	,215	3	84	,885
	Based on Median and with adjusted df	,215	3	82,509	,885
	Based on trimmed mean	.143	3	84	,934

The basis for making data normality test decisions is:

1. If the significance value (sig.) **> 0.05** then the data is homogeneous
2. If the significance value (sig.) **<0.05** then the data is not homogeneous

Based on the data on the output of the homogeneity test using the homogeneity test, the significance level is *based on mean* (0.901), the significance value is *based on median* (0.885), the significance value is *based on median and with adjusted* (0.885), and the significance value is *based on on trimmed mean* (0.934). From this data it can be concluded that the pretest and posttest data on scientific creativity and critical thinking skills are homogeneous.

4. Hypothesis Test Results

Hypothesis testing is carried out to test whether the proposed hypothesis is accepted or rejected. This test uses a *paired sample T test* because the research design is *one group pretest posttest* so it requires paired data samples. Because the previous tests carried out showed that the student score data was normally and homogeneously distributed, a parametric test was used.

The basis for the T test decision is:

1. If the significance value (sig.) **> 0.05** then H_{0ab} is accepted
2. If the significance value (sig.) **< 0.05** then H_{0ab} is rejected or H_{1ab} is accepted

The output of data analysis using SPSS 23 can be seen below.

1. Science Creativity T Test

M =26.364; SD = 2.279; t (21) = 54.254; p = .000

Based on the results of the SPSS 23 test, the significance value of the pre-test and post-test of students' scientific creativity on ecosystem material for class V SD Inpres Malei is 0.000, this value is smaller than 0.005 and it can be concluded that there is an increase in the pre-test to post-test

value of scientific creativity after implementing the PjBL learning model .

2. Critical Thinking Skills T Test

M = 29.773; SD = 2.877; t (21)= 48.533; p = .000

Based on the results of the SPSS 23 test, the significance value of the pre-test and post-test of students' scientific creativity on ecosystem material for class V SD Inpres Malei is 0.000, this value is smaller than 0.005 and it can be concluded that there is an increase in the pre-test to post-test scores for critical thinking skills after implementing the learning model. PjBL.

Based on the results of the SPSS 23 test, the significance value of the pre-test and post-test of students' scientific creativity on ecosystem material for class V SD Inpres Malei is 0.000, this value is smaller than 0.005 and it can be concluded that there is an increase in the pre-test to post-test scores for critical thinking skills after implementing the learning model. PjBL.

The data generated above shows that there are several conclusions that can be drawn, namely; distribution with normality tests using Kolmogorov-Smirnov and Shapiro-Wilk, the results of the pretest and posttest for scientific creativity and critical thinking skills show quite high significance values (greater than the 0.05 significance level). This shows that the data do not have strong enough evidence to reject the assumption that they are normally distributed.

The results of the homogeneity test show that the pretest and posttest data for scientific creativity and critical thinking skills are homogeneous, both in terms of mean, median, trimmed mean, and adjusted mean. This indicates that the variations in the two groups of data (pretest and posttest) are relatively similar.

Based on the results of the T test on SPSS 23, there was a significant increase between the pretest and posttest scores in both scientific creativity and critical thinking skills after implementing the PjBL (*Project-Based Learning*) learning model. A significance value that is smaller than the significance level (0.005) indicates that this increase did not occur by chance, but rather that there was a significant effect from implementing the learning model.

Hypothesis testing in this study aims to determine whether there is a positive influence of the Project Based Learning model on increasing students' scientific creativity and critical thinking skills in class V ecosystem material at SD Inpres Malei. Testing was carried out using the Paired Sample T test after the normality and homogeneity tests were met. The results of the *Paired Sample T* test analysis were obtained with the help of SPSS 23 for Windows. The SPSS output results obtained a significance value smaller than the 0.05 significance level (0.000 < 0.005), so H_0 was rejected and H_1 was accepted, so it can be concluded that there is a positive influence of the Project Based Learning model on scientific creativity and critical thinking skills on ecosystem material. fifth grade student at SD Inpres Malei.

The PjBL model has stages or syntax that can improve students' critical thinking skills. This is due

to the relationship between the syntax of the PjBL model and the critical thinking indicators used in this research.

The first stage in PjBL learning is providing orientation about problems to students. This stage supports critical thinking skills in the aspect of providing simple explanations. Through this stage the teacher focuses questions by presenting problems originating from real phenomena. Through this stage, students are encouraged to think critically in observing and identifying problems so they can formulate problems

The second stage in PjBL organizes students to carry out simple research . This stage supports critical thinking skills in the aspect of providing simple explanations. Through this stage students develop the ability to ask and answer questions about the problems being studied. This stage directs students to understand problems and find solutions to solve them through discussion.

The third stage in the PjBL model is investigating independently and in groups. At this stage it supports critical thinking skills in the aspect of providing the ability to analyze arguments. Through the performance given by the teacher, students identify the questions and statements contained therein and provide arguments as needed. This is done so that students can understand the problem so as to add insight into each interpretation to develop logical reasoning patterns.

The fourth and fifth stages in PjBL are developing and presenting the results of the work as well as analyzing and evaluating the problem solving process. This stage supports critical thinking skills in the inference aspect. Through this stage students develop the skills to create and determine the results of considerations. Students draw conclusions from the results of the discussions that have been held. Students create and determine the results of investigations or discussion results based on the information they have obtained.

PjBL is a learning that involves all students in learning activities and provides more time for students to solve problems individually and in groups (Natty *et al*., 2019). In its implementation, active two-way teaching and learning activities will arise. The use of the PjBL model is expected to provide opportunities for students to improve student learning outcomes in building the four pillars of learning, because students' understanding can increase (*learning to know*) through the process of scientific work (*learning to do*) which is carried out collaboratively (*learning to live together*), so that student learning independence will be achieved (*learning to be*).

The author also considers several of these pillars as confirmation in the implementation of the Independent Curriculum to be very suitable for developing students' critical thinking, three of which are: (1) The development of non-technical abilities and character gets a special portion through project-based learning (PjBL), (2) Efforts to grow student profiles Pancasila, especially on the profile of independence, critical thinking and creativity, as well as (3) Flexibility for teachers to carry out learning in accordance with students' abilities and make adjustments to local context and content so they can focus on essential material.

The stages of the Project Based Learning model support critical thinking skills. This is in line with learning where students solve real problems through their critical thinking skills. Students gain new knowledge through real problems that are solved using discussion methods. This contextual theory states that an effective learning process occurs when students view real problems as learning subjects. This is because students acquire knowledge through direct engagement with real-world problems and the exploration of authentic situations. Such learning activities encourage students to apply their knowledge in real-life contexts and develop critical thinking skills through analysis and problem solving (Rahmawati & Airlanda, 2023; Mulyanti & Hayu, 2024).

PjBL that applies contextual learning links the material taught to students' real-world situations so that students use their critical thinking skills to make connections between the knowledge they have and its application in students' own lives. The research results are in accordance with research by previous researchers which stated that the Project Based Learning model can improve critical thinking skills. The results of previous research conducted by Nurdin Muhamad, with the title "Problem Based Learning Model to Improve Students' Critical Thinking Ability and Accuracy", The aim of this research is to obtain empirical evidence that discusses the implementation of the Project Based Learning (PJBL) model in improving critical thinking abilities and student accuracy. This research is experimental research, so the sample is divided into two, namely the experimental class using the PJBL model and the control class using the model. The instruments used in this research were a critical thinking ability test, an attitude scale based on a Likert scale, a student activity scale and an interview guide.

The description of the results of this research shows that the PJBL model can improve students' critical thinking skills and accuracy, this is demonstrated by the degree of correlation between critical thinking skills and students' accuracy with

strong and significant criteria. Based on the results of research conducted by Fakhriyah with the title "Application of the Project Based Learning Model in an Effort to Develop Students' Critical Thinking Abilities" This research aims to describe the application of Project Based Learning in an effort to develop critical thinking abilities of PGSD FKIP UMK Kudus students in the Science Learning course. This research is included in qualitative descriptive research, because the data obtained is more concerned with the process than the results. One of the advantages of the Project Based Learning learning model is that it is able to train students to use various concepts, principles and skills that they have learned to solve the problems they are facing. By implementing Project Based Learning, critical thinking skills can develop, because the critical thinking skills observed in this research are the ability to identify, analyze, solve problems, think logically and make appropriate decisions and be able to draw conclusions.

The results of the hypothesis test show that the PjBL model has an effect on scientific creativity and critical thinking skills. The problem orientation stage supports cognitive learning outcomes which encourage students to develop their thinking abilities. Students discuss and formulate the problem. Students are given a stimulus to think rationally about the main problems and develop their intellectual abilities in solving problems. This increases students' knowledge of new information based on real experiences presented. This stage supports students' knowledge in improving and understanding the problems being studied.

The stage of organizing students to discuss supports students' critical thinking skills in reasoning about problems. Students think to find solutions to these problems. With discussion and reasoning skills, students discover new knowledge that provides answers to problems. Even though the teacher does not investigate the problem, the teacher can focus on the problem through questions so that students reflect on the problem more deeply. This leads to investigations that will be carried out by students and discover new knowledge.

The independent and group investigation stages stimulate students' thinking abilities in finding information that can be used to solve problems. This stage develops students' rational thinking abilities. The problem formulation that has been formed is investigated by discussion to find a solution. This is done so that problem solving solutions have a strong foundation based on information obtained through joint discussions. This stage increases students' thinking abilities in applying investigations to find answers to problems.

The stage of developing and presenting work results and the stage of analyzing and evaluating the problem solving process supports students' logical abilities. This stage trains students to analyze the results of investigations or discussions so that new knowledge is obtained. The conclusions obtained are based on the information obtained by students developing their thinking skills in describing the results.

The stages in Project Based Learning are proven to support cognitive learning outcomes. This is in line with constructivism theory where knowledge is constructed by students based on interactions with the environment and other objects. Through the PjBL model, students construct their own knowledge based on real experience solving problems. This is consistent with the constructivist learning perspective, which positions students as active learners who construct knowledge by analyzing problems, expressing ideas, and drawing conclusions from their learning experiences (Siregar et al., 2024; Herpratiwi et al., 2023).

Students are directly involved in acquiring new knowledge. Students will better understand and apply it in all situations. Apart from that, students will improve the concept for longer. This is because this knowledge is obtained from analyzing real problems. Siregar et al (2024) also states that in constructivist theory students construct knowledge through interaction with the environment. Every new knowledge that is built is based on previously known knowledge. Constructing students' understanding is also through social constructivism. The teacher creates a situation that allows students to exchange ideas and collaborate in solving problems.

The theory that explains the stages of Project Based Learning to improve learning outcomes is in accordance with previous research conducted by There are several related studies that can be put forward. One of them is research conducted by Sulistyowati, et al., (2020) which explored "The Influence of the Ecosystem Theme Ethnoscience-Based Project Based Learning Model on Student Learning Activities." The focus of this research is to determine the impact of the ethnoscience-based Project Based Learning (PJBL) learning approach on the level of student learning activity as well as the comparison of average learning activities before and after implementing the model. From the results, it was found that after implementing the ethnoscience-based PJBL model, student learning activities experienced a significant increase compared to before.

On the other hand, Hartini (2017) conducted research on "Development of Project Based Learning Model Learning Tools to Improve Elementary School Students' Thinking Abilities." The learning approach developed in this research involves four structured steps, starting from preliminary activities to follow-up activities which include homework assignments and additional motivation. The findings from this research show that the application of the PJBL model with strategies that can be adapted to classroom conditions makes a significant contribution to student learning.

Apart from that, another research conducted by Haryanti (2017) with the title "Problem Based Learning Model Develops Primary School Students' Critical Thinking Abilities" uses the Problem Based Learning (PjBL) approach to improve students' critical thinking skills. Even though it focuses on different learning approaches, this research shows that PjBL has a significant role in developing students' critical thinking abilities.

Then, Winarti *et al.* (2022) revealed that the PjBL learning model is able to improve students' critical thinking skills by providing activities that train thinking skills. This is in line with the focus of current research which examines the use of PJBL to improve elementary school students' critical thinking abilities.

Furthermore, based on research conducted by Afifatul entitled The Effect of Project Based Learning (PjBL) on Student Interest and Learning Achievement "This research is a quasi-experimental research (quasi-experiment research). The results of the research conducted show that: (1) there is a significant influence of the use of Project Based Learning (PjBL) on students' interest in learning, (2) there is a significant influence of Project Based Learning (PjBL) on students' learning achievement in aspects of attitude and knowledge, however there is no significant influence on student learning achievement in the skills aspect.

Based on the results of previous research as a comparison, the research currently being conducted also focuses on implementing the Project Based Learning (PjBL) learning model to increase students' scientific creativity and critical thinking skills in the context of ecosystem material at the elementary school level. So what is novelty or novelty in the findings of this research is that the PjBL learning model turns out, apart from being able to have an effect on increasing learning activities, critical thinking, interest in learning and learning achievement, it can also improve critical thinking skills and scientific creativity as per the results of this research. The research findings attract attention because they reveal that the PJBL learning model not only has a positive impact on learning activities, critical thinking, interest in learning, and learning achievement, but can also improve students' critical thinking skills and scientific creativity.

The uniqueness or novelty of this finding lies in the understanding that the PjBL learning model has significant implications in improving the quality of learning. This strengthens the argument that PjBL is not just a tool to increase student involvement, but also an approach that is able to develop critical and creative aspects in their understanding of subject matter, especially related to ecosystems.

The importance of choosing a learning model is also reflected in the context of SD Inpres Malei class V, where the application of the Problem Based Learning (PjBL) model is considered very appropriate. This is due to the positive impact of PjBL on students' scientific creativity and critical thinking skills. By utilizing this approach, students are accustomed to being actively involved in the learning process which focuses on solving real problems, providing a positive impact on the formation of students' thinking patterns and understanding of the subject matter. Even though the problems presented are not too complicated, the problems faced are related to everyday life. Based on the results of the analysis and discussion presented, it can be concluded that the use of the PJBL model can influence student learning outcomes and critical thinking skills. The use of the PJBL model in this research includes students being able to think critically, being able to solve problems and experiencing learning directly so that students will be more active and participate in learning activities.

Overall, this research makes an important contribution to understanding the effectiveness of the PJBL learning model, especially in the context of the ecosystem at the elementary school level. These findings can be a basis for further development in curriculum design and learning methods oriented towards developing students' scientific creativity and critical thinking skills.

Conclusion

Based on the research results, the results of the SPSS T test output for students' scientific creativity obtained a significance value smaller than the 0.05 significance level ($0.000 < 0.005$), so H_0 was rejected and H_1 was accepted, so it can be concluded that there is a positive influence of the Project Based model. Learning about scientific creativity in ecosystem material for fifth grade students at SD Inpres Malei.

The output results of the SPSS T test for students' critical thinking skills obtained a significance value smaller than the 0.05 significance level (0.000 < 0.005), so H_0 was rejected and H_1 was accepted, so it can be concluded that there is a positive influence of the Project Based Learning model on critical thinking skills on ecosystem material for fifth grade students at SD Inpres Malei . This proves that the PjBL model has an influence in increasing the scientific creativity and critical thinking skills of fifth grade students at SD Inpres Malei .

Acknowledgements

I would like to express my deep gratitude to Prof. Mery Napitupulu, who has been my main mentor, and to Mrs. Dr. Lilies N. Tangge MP., who sincerely and sincerely helped me in completing this scientific work. I also convey infinite thanks to my parents and husband who always provide support and motivation to me, as well as to my children. All their help and encouragement meant a lot to my journey in completing this article.

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