

The Effect of Project Based Learning Model on Students' Critical Thinking Abilities in the Science Subject of Grade V UPTD SDN 124385 Pematangsiantar

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Abstract

This study aims to determine the Influence of the Project Based Learning Model on Students' Critical Thinking Skills in Social Studies Subjects of Class V Uptd Sdn 124385 Pematangsiantar. This type of research is experimental research because this study aims to determine the relationship between the application of the Project Based Learning (PjBL) learning model and the improvement of students' critical thinking skills. This research was conducted by researchers at UPTD SD Negeri 124385 Pematangsiantar. The determination of the sample in this study was all fifth grade students of UPTD SD Negeri 124385 Pematangsiantar, totaling 21 students. Data collection techniques are the most important step in research, because the main purpose of research is to obtain data. Based on the results and discussion of the research in the previous section, it can be concluded that the application of the PjBL learning model significantly improves the critical thinking skills of fifth grade students of UPTD SDN 124385. This is evident from the increase in the average score of students from 55 in the pretest to 85.25 in the posttest. The results of the Normality Test on the pretest were 0.097 where the sign 0.097 > 0.05 indicating that the pretest score was normally distributed and the results of the normality test on the posttest were 0.100 where the sign 0.100 > 0.05 then the posttest score was also normally distributed. The results of the hypothesis test showed a t_{count} value of 12.643 which was greater than the t_{table} of 1.729 which stated that the null hypothesis (h_0) was rejected and the alternative hypothesis (h_a) was accepted. The results of the N-Gain IV Test showed an increase with the criteria of a result value of 0.49 or categorized as moderate because $0.30 < N-gain < 0.70$. This shows that there is a significant effect of the implementation of the Project Based Learning Model on the Critical Thinking Skills of Students in Social Studies Subjects of Class V UPTD SD Negeri 124385 Pematangsiantar in the 2024/2025 Academic Year.

Keywords: Learning Model, Project Based Learning, Critical Thinking Skills, Students

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1. Introduction

Education in Elementary School (SD) is an education that is organized as an effort to provide basic skills in the form of knowledge, skills, and attitudes that are useful for themselves according to their level of development. Education is a provision for humans to face the developing world. Education can build individuals who are intelligent, creative, independent, never give up, respect others, have skills and discipline. The education system faces many problems in achieving the best quality of learning. 21st century education is marked by the rapid development of technology and information, so education must be able to adapt to determine the right type of learning. However, the challenges faced in education today are very complex. One of the biggest challenges is motivating students to be actively involved in the teaching and learning process and understand the concept in depth.



Independent Curriculum is an educational policy that aims to provide freedom to schools and teachers in developing a curriculum that is appropriate to the needs of students and the local context. According to Novak(Bradley, Moore, Simpson, & Atkinson, 2018).The Independent Curriculum emphasizes a responsive, inclusive, and student-centered learning approach. This curriculum is designed to help students develop 21st-century competencies such as problem solving, creativity, communication, and collaboration. The implementation of the Independent Curriculum involves various interrelated components. According to Haryanto(Hermanto, Sarwi, & Yusuf, 2020)The success of the implementation of the Independent Curriculum is highly dependent on the active role of teachers as learning facilitators who are able to facilitate students in developing skills, knowledge, and attitudes. This program aims to become a model or center of excellence in the implementation of the Independent Curriculum and provide inspiration and guidance to other schools.(Heaviside, Manley, & Hudson, 2018).

Success in education cannot be separated from the role of a teacher. Teachers play a very important role in the learning process. (Noordiana, 2016:120) In addition to being an educator, teachers also play a role as evaluators, namely assessing the success of a learning process so that if in the learning process it turns out that the expected results are not in accordance with the educational goals that have been set, then a teacher has a role to improve and enhance the processes in learning. To create quality education and produce reliable human resources in their fields, then renewal in the education process must continue to be carried out with the aim of helping to realize educational goals. One effort that can be made is to improve and develop the learning model carried out in the learning process. One effort that can be made is to apply a learning model that can support the learning process so that students can actively participate in the learning process so that the educational goals that have been set can be achieved properly.

Thinking skills are abilities that are very necessary in facing life's challenges. These skills include critical thinking skills, creative thinking skills, and problem-solving skills.(Vogler et al., 2018a).Critical thinking skills are abilities that are very necessary for someone to be able to face various problems faced in social and personal life. There are several definitions of critical thinking. Facione(Vogler et al., 2018)states that critical thinking is self-regulation in deciding something that results in interpretation, analysis, evaluation, and inference, as well as presentation using evidence, concepts, methodologies, criteria, or contextual considerations that form the basis for decision making. Choy & Cheah(Wahyuni, Alam, & Laliyo, 2023)defines critical thinking as a complex process that requires high-level cognition in processing information. Ennis(Pusparini & Widyanarko, 2021)adding that critical thinking is the ability to think reflectively and reasonedly that focuses on what is believed or done. Critical thinking skills include basic clarification skills, decision-making bases, concluding, providing further explanations, estimates and integration, and additional skills.

The low critical thinking skills of students are caused by learning models that teach critical thinking skills that have not been used appropriately in every classroom learning (Zahroh, 2020). Education can be improved through the development of students' thinking skills. Therefore, teachers are expected to be able to choose the right learning model to be applied in the teaching and learning process. The learning model that is suitable for training students' critical thinking skills is the PjBL Model.(Kurniasih, Mastur, & Juhana, 2023).

In improving critical thinking skills, it is not only centered on students, but there must be an understanding from teachers in implementing learning strategies. (Mabrurroh, 2019), critical thinking is thinking with the aim of making reasonable decisions about what is believed or done. Critical thinking is the ability to use logic. Logic is a way of thinking to gain knowledge that is accompanied by checking the truth based on certain reasoning patterns. The six basic elements of critical thinking according to Ennis are Focus, Reason, Inference, (situation), Clarity and Overview. The learning model is one component of the learning model education system that refers to the learning approach that will be used, including the learning objectives that will be used. Learning models that can make students more active during the learning process are the Inquiry model, Project Based Learning (PjBL), Cooperative Learning, and Problem Based Learning (PBL).

The PjBL (Project Based Learning) model is an innovative learning model that is centered on students and places teachers as motivators and facilitators where students are given the opportunity to create a project based on what they have learned according to the creativity of each student. (Damayanti, Nanggala, & Suryadi, 2023). The application of the PjBL model has the potential to meet learning demands, this is based on the success of the application of the PjBL learning model in previous studies. Among them according to Sunardin (2019) who concluded that the project-based learning model has been proven and tested as one of the learning models that provides independence for students, especially in learning that allows project work to be carried out. This project-based learning focuses more on life problems that are meaningful to students, the role of the teacher is to present problems, ask questions and facilitate students in designing a project that they are working on. And this will increase students' creativity in designing a project that they will then work on within the time provided by the teacher according to the concept taught.

The advantages of project-based learning models can increase students' learning motivation, resource management skills, and problem-solving and collaboration skills. Project-based learning makes it easier for students to understand the material because students can directly apply their knowledge to the projects that have been prepared. Students will find it easier to remember the concepts they have learned with this project. PjBL is one of the learning options that can be used to assess cognitive aspects and student performance.

Efforts are needed to maximize learning through the application of more effective learning models. One of the solutions offered is the Project-Based Learning (PjBL) model. (Chen & Yang, 2019), The PjBL model is a group learning that can facilitate variations in students' learning modalities, especially in the verbal, kinesthetic, visual, and auditory aspects while encouraging students to work together and play an active role in their groups. Learning that is carried out through problem solving by finding concepts, principles, and learning experiences from students themselves will make students more motivated, active, creative, and critical. Basically, science learning aims for students not only to understand the material but also to be able to apply their understanding in projects or works to solve problems that arise in everyday life. Therefore, in science learning in Elementary Schools, an innovative learning model is needed, so that students experience or do and find their own knowledge with guidance from the teacher. An innovative and varied learning model is needed to support the achievement of the expected science learning objectives. Because by choosing the right learning model, it will be able to attract the attention of students to actively participate in the learning process. Students who actively participate in the learning process will try to develop all their potential in order to achieve the expected learning objectives.

Facts on the ground show that problems arise when learning uses conventional models that focus on lectures, textbooks, and teachers. As a result, students' thinking skills are reduced because of the teacher's focus. This can hinder students' ability to think critically, so that the answers given are only focused on lessons and concepts. Therefore, critical thinking skills in schools must be improved by giving students the freedom to express their opinions about what they think.

When teachers give students the opportunity to ask questions about material that they do not understand, students tend to be quiet and passive. This causes the learning process to become monotonous, so that students' critical thinking skills are less honed. As a result, at the end of the explanation, students have difficulty in summarizing and concluding the lessons that have been carried out. When asked for their opinions by the teacher, students have not been able to express their opinions. When the teacher asks questions, students have not been able to answer the questions perfectly. This indicates that students' critical thinking skills are still low ((Pramest, Probosari, & Indriyanti, 2022). One way to improve students' critical thinking skills, especially in science subjects, is to apply a project-based learning model or also known as PjBL. This researcher tried to improve the critical thinking skills of fifth grade students of SDN 124385 Pematangsiantar by applying the PjBL model so that they can relate to everyday life with the subject matter. In addition, it can foster and increase students' self-confidence because it encourages students to actively participate in the learning process including asking, answering, and providing conclusions when the lesson ends. (Widiastuti, 2021).

This PjBL learning model plays an important role in helping students achieve various educational goals in science subjects in elementary schools. Through this model, students can develop knowledge and understanding that is useful and can be applied in everyday life. In addition, PjBL also encourages students' curiosity, positive attitudes, and awareness of interactions between the environment and society. So that researchers will conduct research with the title "The Effect of Project Based Learning Models on Students' Critical Thinking Skills in Science Subjects of Class V UPTD SD Negeri 124385 Pematangsiantar"

2. Method

This type of research is experimental research because this research aims to determine the relationship between the application of the Project Based Learning (PjBL) learning model and the improvement of students' critical thinking skills. Thus involving two variables, an experiment needs to be conducted to find an increase in students' critical thinking skills. According to the author, it is more appropriate to use the intended experimental research because to find out whether or not there is an influence of something forced on the subject, by carrying out initial activities where without using a learning model, then in subsequent learning students are given treatment in the form of a Project Based Learning (PjBL) learning model. According to Sugiyono (Putri & Supatmo, 2020) Experimental research can be defined as a research method used to find the effect of certain treatments on others under controlled conditions.

This study was designed using the Pre-Experiment method where in this study the dependent variable group will be given the application of the independent variable where there are changes that occur in the dependent variable if the independent variable is given in this study using a one-group pretest-posttest design. This research design only involves one class without a control class or experimental class where this one-group pretest-posttest only involves one class, namely the experimental class which begins with a pretest before the treatment is carried out in the form of a learning model then carries out the Project Based Learning (PjBL) learning model then conducts a posttest to find out whether the hypothesis that has been put forward is successful or not. The author conducted a one-group pretest-posttest research design because in the author's research model the influence of the relationship between the learning model and students' critical thinking skills, there needs to be a change in the research, so the researcher conducted a research design without a control class and an experimental class (Rusmansyah, Leny, & Sofia, 2023). This research was conducted by researchers at UPTD SD Negeri 124385 Pematangsiantar. This research is planned to be conducted by researchers in the 2024/2025 academic year at UPTD SD Negeri 124385 Pematangsiantar. One of the important things in research is to define the population clearly. According to Sugiyono (2019:117) "Population is a generalization consisting of: objects/subjects that have certain qualities and characteristics determined by researchers to be studied and then interpreted in their conclusions. The population in this study were all fifth grade students of UPTD SD Negeri 124385 Pematangsiantar totaling 21 students.

A sample is a portion of the population taken using a sampling technique (Husain and Purnomo, 2001). Here the sample must truly reflect the state of the population, meaning that the conclusion of the research results taken from the sample must be a conclusion about the population. The determination of the sample in this study was all fifth grade students of UPTD SD Negeri 124385 Pematangsiantar, totaling 21 students. Data collection techniques are the most important step in research, because the main purpose of the research is to obtain data. (Aprianti, Negara, Ke, & Suadnyana, 2017). Data collection techniques are ways or methods used by researchers to collect information, facts, or data that are relevant to research objectives. Data analysis was conducted using statistical analysis techniques. The statistical method used in this data analysis is the descriptive statistical method. Descriptive statistics are used to analyze data by describing or depicting the collected data without intending to make general conclusions or generalizations according to Ali Muhson (Anjarini, 2017).

In hypothesis testing using paired sample t-test, it begins with formulating a statistical hypothesis, namely a statistical hypothesis with a one-sided approach and a two-sided approach. It should be noted that if in formulating a statistical hypothesis it states the difference

between two sample groups, but does not mention which sample group has a higher value, then the results of the t_{count} calculation will be at both ends of the normal distribution curve. In this case, the researcher uses a two-sided approach. Conversely, if it is stated which group has a higher value, then the researcher uses a one-sided approach. The next step is to determine the level of significance that will be used in the hypothesis test analysis. In this study, the researcher tested the hypothesis using SPSS 24.

3. Results and Discussion

Description of Research Results

This study is an experimental study that aims to determine the Effect of the Project Based Learning Model on Students' Critical Thinking Skills in the Social Sciences Subject of Class V UPTD SD Negeri 124385 Pematangsiantar in the 2024/2025 Academic Year. The instrument test in this study used a descriptive test that was first validated by two validator lecturers, namely Mr. Osco P. Sijabat, S.Pd., M.Pd. and one elementary school teacher, namely Frantriani Elisabeth Siallagan, S.Pd. The validator provided an assessment of the descriptive questions through a validation sheet that had been designed. After the validator stated that the questions were suitable for testing, the researcher conducted research on other validators. (Fitri, Dasna, & Suharjo, 2018). This research is a quantitative research and this research was conducted on April 10, 2025 - April 17, 2025, this research was aimed at grade V students of UPTD SD Negeri 124385 Pematangsiantar with a sample of 20 students. The research data was obtained from the results of the pretest and posttest containing 5 questions with a scale of 4. From the content validation table above, the assessment of the questions is included in the score range $V \geq 0.8$ or is included in the high category.

Based on the validation results that have been carried out by the validator above, it can be seen that the researcher's experimental assessment scale is valid and can be used as a research instrument. After being validated by the validator, it was continued with the implementation of research in class V UPTD SD Negeri 124385 Pematangsiantar on the Effect of the Project Based Learning Model on Students' Critical Thinking Skills in the Science Subject of Class V UPTD SD Negeri 124385 Pematangsiantar.

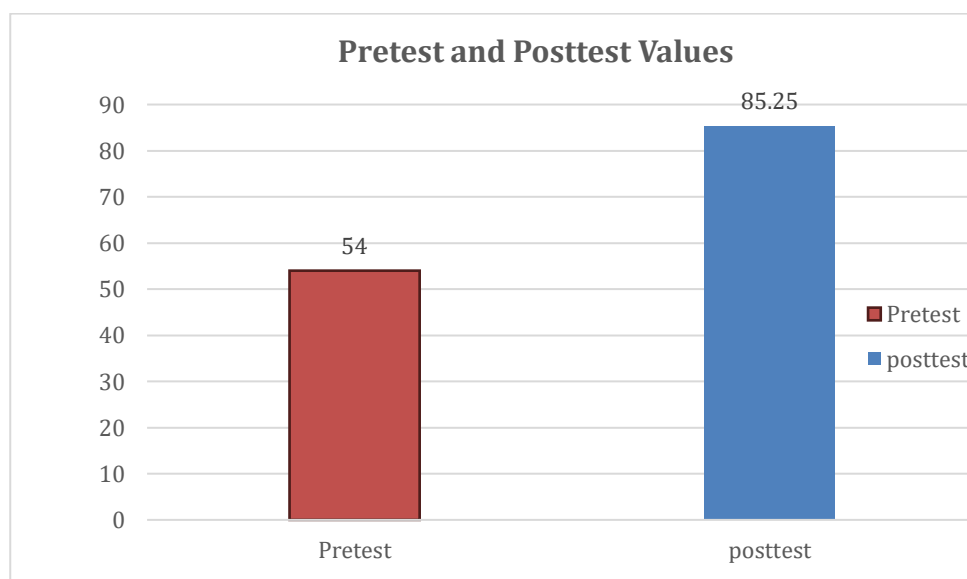


Figure 1. Pretest and Posttest Average

Inferential Statistical Data Analysis

Normality Test

Prerequisite tests are needed in research activities which are stages that must be carried out before entering the hypothesis test analysis stage. One of the prerequisite tests is the data

normality test. In testing data normality, researchers use the Shapiro-Wilk method through the SPSS 24 application. Then the output results that will appear are as follows:

Table 1. Normality Test Results

Normality Test	Shapiro Wilk		
	Statistics	df	Signature.
Pre-Test Score	.919	20	.097
Post Test Score	.920	20	.100

(Source: SPSS 24 Output)

The results obtained using the SPSS 24 application are Statistic = 0.919 for pretest value data and Statistic = 0.920 for posttest value data. Likewise with the analysis of the output results obtained, that the pretest value data and posttest value data are normally distributed. This is because the Sig. value in both data is greater than 0.05 (0.097 > 0.05 for pretest and 0.100 > 0.05 for posttest).

Hypothesis Testing

Hypothesis testing uses a t-test with a paired sample t-test type that can help researchers make decisions based on objective and measurable data analysis, so that researchers can more easily draw conclusions based on evidence from the observed data. The following are the results of the pretest and posttest analysis:

Table 2. Statistical Data Result Values

Paired Sample Statistics		Means	N	Standard Deviation	Standard Error of the Mean
Couple 1	Pre-Test Value	54.0000	20	11.19210	2.50263
	Post_test value	85.2500	20	9.97827	2.23121

Source: Data Processing

Table 3. Results of Correlation Values Between Pretest and Posttest Data

Paired Sample Correlation		N	Correlation	Signature
Couple 1	Pre-Test Scores and Post-Test Scores	20	.459	.042

Source: Data Processing

Table 4. Results of Hypothesis Testing with Paired Samples Test

Paired Sample Test		Difference in pairs		Standard Error of the Mean	95% Confidence Interval of Difference		T	Df	Sig. (2-tail s)
		Means	Standard d. Deviation		Lower	On			
Couple 1	Pret est_Valu e &	-31.2500	11.05429	2.471881	-36.42355	-26.07643	-12,643	19	.000

**Post
test
Valu
e**

Source: Data Processing

The results of the hypothesis test calculation with the Paired Sample T-test obtained output results consisting of a description of student scores, calculations of correlation between variable data and results of hypothesis test calculations. In the description of the student score output seen in the Table, it can be seen that the average student pretest score is 54 while the average student posttest score is 85.25. In addition to the average score (mean), the Table also obtains the calculation of the standard deviation value and the mean standard error value.

In Table 4.13, the correlation value between the pretest group and the posttest group consisting of 20 students is 0.459 with a Sig. value of 0.042. So it can be said that the pretest and posttest values have a relationship. Furthermore, it can be seen from Table 4.14, namely the results of the paired sample t-test calculation obtained an average value of the difference between the pretest and posttest of -31.25000 with a standard deviation of 11.05429. Another result obtained is the value with $df = 19$ where it is obtained with sig (2-tailed) $0.000 < 0.05$ then rejected and accepted. So it can be concluded that there is an influence of the PjBL learning model on the critical thinking skills of grade V students of Social Studies topic A about How is My Indonesia at UPTD SDN 124385 Pematangsiantar in the 2024/2025 Academic Year. $t_{hitung} = 12,643 > t_{tabel} = 1,729$ $t_{hitung} > t_{tabel} = 12,643 > 1,729 H_0 H_a$

N-Gain Test

After knowing the pretest value (before being given treatment) and the posttest value (after being given treatment), the researcher will measure the effectiveness of the Project Based Learning learning model on students' critical thinking skills. To test the effectiveness of the Project Based Learning learning model, calculations are used using Microsoft Excel 2021, namely with the N-Gain effectiveness formula. The calculation of the N-Gain test can be seen in Table 1.

Table 5. N-Gain Data

N-GAIN SCORE CALCULATION						
Name	Pre-exam	Post-exam	Post-Pre	Ideal Score (100-pre)	N Get Score	N Profit Value (%)
S1	50	70	20	80	0.25	25
S2	60	80	20	80	0.25	25
S3	50	75	25	75	0.333333333	33,33333333
S4 Size	60	90	30	70	0.428571429	42.85714286
S5	50	100	50	50	1	100
S6	50	85	35	65	0.538461538	53.84615385
					0.075268817	7.52688172
S7	65	72	7	93	years	years
S8	25	70	45	55	0.818181818	81.81818182
S9	60	85	25	75	0.333333333	33,33333333
						66.66666667
S10	50	90	40	60	0.666666667	years
S11	70	100	30	70	0.428571429	42.85714286
S12	40	85	45	55	0.818181818	81.81818182
S13	40	90	50	50	1	100
S14	70	100	30	70	0.428571429	42.85714286
S15	60	85	25	75	0.333333333	33,33333333
S16	55	78	23	77	0.298701299	29.87012987
S17	70	100	30	70	0.428571429	42.85714286

season						66.66666667
18	50	90	40	60	0.6666666667	years
S19	55	85	30	70	0.428571429	42.85714286
S20	50	75	25	75	0.333333333	33,33333333
Means	54	85.25	31.25	68.75	0.49	49.00

Source: Microsoft Excel 2021 output

Based on the data from the experimental class gain calculation results, the pre-test average was 54 and the post-test average was 85.25, resulting in a gain of 0.49. This means that the experimental class experienced an increase in critical thinking skills with a moderate category because $0.30 < N\text{-gain} < 0.70$.

Discussion and Research Results

This research was conducted at UPTD SDN 124385 Pematangsiantar in science learning for grade V with a sample of 20 students. This study aims to determine whether or not there is an effect of using the PjBL learning model on the critical thinking skills of grade V students in science learning at UPTD SDN 124385 Pematangsiantar in the 2024/2025 academic year. The method used is a pre-experiment with a One Group Pretest-Posttest design. In the data collection process, the researcher used a pretest and posttest question distribution technique, each containing 5 descriptive questions. The pretest was given before the treatment was given, while the posttest was given after the treatment was given. The PjBL learning model was chosen because it was considered capable of providing direct practice to students by honing and getting them used to thinking critically and can train students to relate problems in everyday life to learning at school.

In this study, the researcher used quantitative research using an experimental method with a one group posttest design. In the research process, the researcher first validated the questions to 1 lecturer, Mr. Osco P. Sijabat, S.Pd., M.Pd and 1 teacher, Mrs. Frantriani Elisabeth Siallagan, S.Pd. Then after that the researcher calculated the value of content validation, construct validation, and language with the Aiken v formula to find out whether the questions were valid or not. Then the valid questions will be used for the pretest and posttest. After that the researcher gave the test 2 times, namely the initial test before being given treatment (pretest) and the final test after being given treatment (posttest).

Based on the research that has been conducted, there is an increase in critical thinking skills in the use of the PjBL learning model, because in addition to getting new things, students are also more active in asking questions and being progressive during learning and making students interested in asking and finding out for themselves the lessons given. The results of this study are in line with research that has been conducted by Suyit Ratno (Ula, 2020) which states that students' critical thinking skills have improved because teachers have abandoned conventional learning models that tend to make students passive. Teachers have also implemented other learning models, one of which is the PjBL learning model where students are required to be more active, such as answering questions given by the teacher. In addition, there is also research conducted by Mawardi (Anas, 2017) which states that after a comparison was made between the control class given a conventional learning model with the experimental class given a PjBL learning model, it was concluded that there was a difference in students' critical thinking skills in science learning. Where the average posttest score in the experimental class was higher than the average posttest score in the control class. (Khairani & Safitri, 2017).

Furthermore, the researcher conducted data analysis on the pretest and posttest scores and obtained an average pretest score of 54. The lowest score was 25 and the highest score was 70. While the average score on the posttest after being given treatment was 85.25. The lowest score was 70 and the highest score was 100. This shows that the average posttest score is greater or higher than the average pretest score. This increase shows that the PjBL learning model is quite effective in improving students' critical thinking skills in science learning in class V UPTD SDN 124385 Pematangsiantar (Sutrisno, Swistoro, & Medriati, 2018).

In this study, a prerequisite test was conducted, namely the normality test and for the pretest value obtained a normal distribution with a result of 0.097 where $0.097 > 0.05$ and for the posttest value also normally distributed with a result of 0.100 where $0.100 > 0.05$. Because

the data is normally distributed, the researcher continued to conduct a hypothesis test with a t-test assisted by SPSS 24 and obtained a t-count result of 12.643. With the t-count value, it can be concluded that the t-count value is greater than the t table ($12.643 > 1.729$), with sig (2-tailed) = 0.000 < 0.05 then the Null Hypothesis (H_0) is rejected and the Alternative Hypothesis (H_a) is accepted. Thus, from the results of the study, it can be concluded that there is an influence of the Project Based Learning Model on Students' Critical Thinking Skills in Social Studies Subjects for Class V of UPTD SD Negeri 124385 Pematangsiantar in the 2024/2025 Academic Year. $H_0 H_a$ (Harefa, 2020).

Furthermore, the researcher calculated the N-Gain value to determine the increase in the PjBL model used in improving students' thinking skills, so the author calculated it using the N-Gain formula. Based on the results of the N-Gain test, it was concluded that in grade IV students there was an increase with a result value criterion of 0.49 or in the moderate category, so the conclusion from the N-Gain test table above is that there is an influence of the PjBL learning model on students' critical thinking skills in science subjects in the moderate category.

4. Conclusion and suggestions

Based on the results and discussion of the research in the previous section, it can be concluded that the application of the PjBL learning model significantly improves the critical thinking skills of class V students of UPTD SDN 124385. This is evident from the increase in the average score of students from 55 in the pretest to 85.25 in the posttest. The results of the Normality Test on the pretest were 0.097 where the sign $0.097 > 0.05$ which indicates that the pretest score was normally distributed and the results of the normality test on the posttest were 0.100 where the sign $0.100 > 0.05$ then the posttest score was also normally distributed. The results of the hypothesis test showed a value of 12.643 which is greater than 1.729 which states that the null hypothesis (H_0) is rejected and the alternative hypothesis (H_a) is accepted. The results of the N-Gain IV Test showed an increase with the criteria of the result value of 0.49 or categorized as moderate because $0.30 < \text{N-gain} < 0.70$. This shows that there is a significant influence of the implementation of the Project Based Learning Model on Students' Critical Thinking Skills in the Social Studies Subject of Class V UPTD SD Negeri 124385 Pematangsiantar in the 2024/2025 Academic Year. $t_{hitung} > t_{tabel} H_0 H_a$

Suggestion

Based on the conclusions and results of the research that have been described previously about the application of the PjBL learning model to students' critical thinking skills in science subjects in Class UPTD SD Negeri 124385 Pematangsiantar. The researcher makes the following suggestions: In the learning process, teachers should be able to apply the PjBL learning model or other learning models that are more effective and innovative so that students are interested, more active in the learning process, in order to create a pleasant and memorable learning atmosphere for students. Teachers are also expected to be able to provide more attention and supervision for students with low comprehension. Students who tend to be passive in the learning process are advised to use the PjBL learning model in the hope of motivating and fostering students' curiosity by involving them in learning, and by using this PjBL learning model, students can build more active interactions and cooperation between friends and teachers. Making policies and learning designs using the PjBL learning model for teachers with the aim of stimulating students' learning motivation and interest in learning. This aims to make the teaching and learning process more effective and innovative. So that students experience increased learning outcomes and can form critical thinking patterns of students at the school. For researchers, it is expected to be able to develop the PjBL learning model on other materials with the aim of finding out whether the PjBL learning model can be applied to all materials or subjects. As a reference material for other studies that examine problems related to the PjBL learning model. and it is expected to be able to develop and apply the PjBL learning model to other materials or subjects.

CONCLUSION

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