

## The Influence of Problem Based Learning (PBL) Model on Students Science Skill in Material of Substances and Alteration Changes at Grade IV UPTD SDN Percontohan

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ABSTRACT

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This research aims to determine the influence of the Problem Based Learning (PBL) model on students' science process skills in the form of substances and their changes in class IV UPTD at a pilot state elementary school. The method in this research is the research method used is a type of quantitative research, namely Quasi experimental with a Two Group Pretest-Posttest design. The sampling technique in this research uses Cluster Random Sampling, namely samples taken based on groups. Using the Cluster Random Sampling Technique, from 12 classes, 2 classes were taken which will be given learning treatment using different models, namely class A using the Problem Based Learning (PBL) model and B using conventional methods. The Cluster Random Sampling technique is a regional sampling technique for determining samples if the object to be researched or the data source is very broad, with two research variables: the dependent variable (x) in the form of learning outcomes, and the independent variable (y) in the form of the Problem Based Learning (PBL) model. ) . The data collection technique is the test technique. The test results using the hypothesis testing technique (t test) with the help of the spss program, based on the calculation results, are obtained if  $t_{count} > t_{table}$  with a significance level of 0.05 then  $H_0$  is rejected and  $H_a$  is accepted.  $t_{count}$  5.147 and  $t_{table}$  1.697 means  $5.147 > 1.697$  so that  $H_0$  is rejected and  $H_a$  is accepted, meaning that there is an influence of the Problem Based Learning (PBL) model on the Science Process Skills (KPS) of students at UPTD SD Negeri Pilot.

## **INTRODUCTION**

Education has a very important role in advancing the Indonesian nation to achieve the goals of the Indonesian state. Education is a component of human life because it is able to create someone with character and quality so that they have a broad view of the future, through education students can train the skills contained within themselves. According to the Minister of Education and Culture, Nadiem Anwar Makarim, BA, there are two important things in MBA in education, namely freedom to learn and driving teachers. Freedom to learn means that teachers and students have the freedom to innovate, the freedom to learn independently and creatively.

An independent curriculum is a curriculum that focuses on developing students' interests and talents from an early age. The curriculum focuses more on student competency and character development. This means that this curriculum frees students to choose subjects according to their interests, talents and aspirations. The implementation of the independent learning policy encourages the role of teachers both in curriculum development and in the learning process. Apart from being a source of learning, in independent learning, teachers act as learning facilitators who are supported by professional, pedagogical, personality and social competencies.

Education aims to guide all the natural powers (God's will) that exist in these children, so that in the future they as humans and members of society can achieve the highest safety and happiness. Education is a very important aspect in preparing human resources for development. For a nation that wants to progress, education must be viewed absolutely as a necessity, the same as other needs. Education can be seen to be viewed and measured from its position to contribute to the intelligent life of the nation and promote education that is successful in forming a young generation that is intelligent, has character, morals and a good personality.

Natural Sciences (IPAS) is a science that studies living things and inanimate objects in the universe and their interactions and examines human life as individuals as well as social creatures who interact with their environment. In general, science is defined as a combination of various knowledge that is arranged logically and systematically by taking into account cause and effect (Big Indonesian Dictionary, 2016). This knowledge includes natural and social knowledge. In learning sciences there are 2 main elements, namely understanding sciences (science and social) and process skills.

The process skills approach is essentially a management of teaching and learning activities that focuses on students actively and creatively in the process of obtaining learning outcomes. The characteristics of the process skills approach are that it emphasizes the importance of learning to achieve adequate learning outcomes, emphasizes the importance of student involvement in the learning process, emphasizes two-way learning, intellectual and emotional involvement, creative student participation in the teaching and learning process, teachers act as facilitators and coordinator of student learning activities.

In practice, students still lack curiosity to ask questions or give opinions on material that is not yet understood to the teacher during the learning process, student behavior tends to only listen and record the lessons given by the teacher, students do not want to ask, let alone express opinions about the material given, so that will have an impact on less than optimal learning outcomes. Therefore, to overcome this problem, teachers must look for fun learning models and apply them in learning so that students' interest in learning grows and students do not get bored while learning is taking place.

The author found that learning still uses the conventional learning model (lecture) so that the learning outcomes of class IV UPTD students at SD Negeri Perpilotan Pematang Siantar are still low and not in accordance with the KKM that has been determined by the school. Only 14 (46.66%) completed IPAS with KKM 75 and 16 (53.33%) did not complete it, Indonesian with KKM 75 only 13 (43.33%) completed it, and 17 (56.66%) of those who were incomplete, SBDP with a KKM of 80, only 12 (40%) were completed, and 18 (60%) were incomplete.

One learning model related to student activity and critical thinking is the Problem Based Learning (PBL) learning model. Duch et al in Hamruni (2012) the Problem Based Learning model provides conditions for improving critical thinking skills and being able to solve problems in real life so that it will create a culture of thinking in students. Abidin (2014) Problem Based Learning is a learning model that provides experiences that encourage students to learn actively, construct knowledge and combine the context of learning at school and learning in real life naturally.

Kunandar (2011:173) Problem Based Learning is a learning approach that uses real world problems as a context for students to learn how to think critically with problem solving skills and to gain essential knowledge and concepts from learning material.

Based on the description above, to reduce the difficulties experienced by students, observations were carried out. The researcher used the title "The Influence of the Problem Based Learning (PBL) Model on Students' Science Process Skills in the Material of Substance Forms and Changes Class IV UPTD Pilot State Elementary School"

## **THEORETICAL FRAMEWORK**

The success of learning science and science is not only seen from the cognitive aspect which is oriented towards working on practice questions, but also requires students' direct experience to process understanding science concepts. The process in question cannot be done just by reading and memorizing, but requires Science Process Skills (KPS) which are trained in a lesson. Science Process Skills (KPS) can provide students with direct experience in the process so that students are able to comprehend, comprehend and remember science learning over a relatively longer period of time. The Science Process Skills (KPS) that are trained are thought to make it easier for students to gain learning experience so that students' mastery of concepts will also be high. On the other hand, if Science Process Skills (KPS) are not trained, it is thought that it can make it difficult for students to gain learning experience so that students' mastery of concepts will also be low.

Apart from Science Process Skills (KPS) which need to be trained in a learning process, teachers must also apply an appropriate model. *The Problem Based Learning (PBL)* model is one of the innovative learning models that can be expected in the learning process because students play a more active role in solving problems given by the teacher. Students not only receive information, but students also seek their own solutions to existing problems. This *Problem Based Learning (PBL)* model is expected to improve students' Science Process Skills (KPS) and make students more active in learning so that science and science lessons become more interesting.

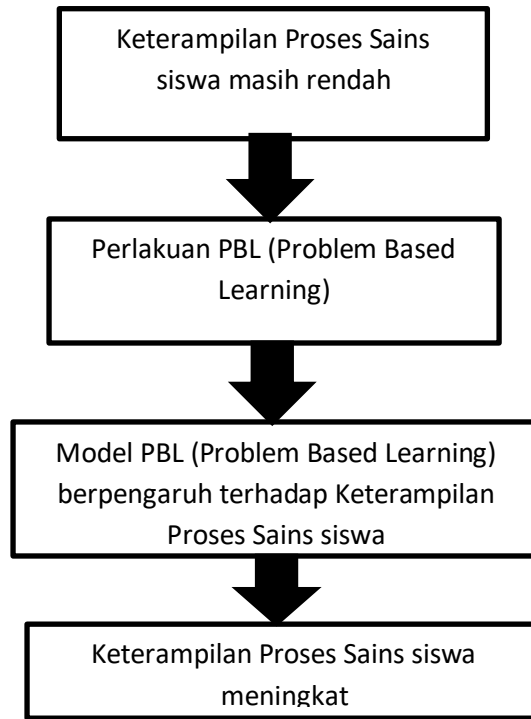


Figure 1 CONCEPTUAL FRAMEWORK

**METHOD**

The research method used is a type of quantitative research, namely Quasi experimental with a Two Group Pretest-Posttest design. The reason for using the Two Group Pretest-Posttest is because the aim is to compare the effects of a particular treatment with another, different treatment. The advantage of this research design is that it provides researchers with a measure of comparison between the treatment group and the control group. This research involved two classes, where one class, namely the experimental class, was given treatment, while the other class, namely the control class, was not given treatment. The experimental class uses the *Problem Based Learning* (PBL) learning model, while the control class uses conventional learning. The research design used was Two Group Pretest-Posttest Design.

**Table 1 Two Group Pretest-Posttest Design**

Group	Initial Test	Treatment	Final Test
Experiment	T <sub>IE</sub>	X	T <sub>2E</sub>
Control	T <sub>IK</sub>	O	T <sub>2k</sub>

Information :

- T<sub>IE</sub> = Giving an initial test (Pre Test) to the experimental class
- T<sub>IK</sub> = Giving an initial test (Pre Test) to the control class
- T<sub>2E</sub> = Giving the final test (Post Test) for the experimental class
- T<sub>2k</sub> = Giving the final test (Post Test) to the control class
- X = Treatment with the *Problem Based Learning learning model*
- O = Conventional Learning

Population is the subject of research. The population in this study consisted of students in class I AB-VI AB UPTD State Elementary School consisting of 12 classes totaling 330 students. The sample is part of the number and characteristics of the population. The samples from this research were class IVA students with a total of 30 students and class IV B with a total of 30 students. The instruments in this research were in the form of tests, with validity, and data collection techniques were normality tests, homogeneity tests, hypothesis tests.

## RESULTS AND DISCUSSION

### Result

Data collection in this research was obtained by testing students' Science Process Skills. The learning model used is the Problem Based Learning learning model on material forms of substances and their changes. The research design used is Two Group Pretest-Posttest which involves two classes to be compared. The two classes will initially be given a pretest, then treated and finally given a posttest to the research subjects. The samples in this research were students in class IV B as a control class with a conventional learning model and IV A as an experimental class with a problem based learning model.

Based on the results of research on students in classes IV A and IV B, different score values were obtained from the pretest and posttest, where the tests carried out were data normality tests, homogeneity tests and hypothesis tests, namely the t-test.

### Research Instrument

#### 1. Validity Test

Before carrying out the research, the researcher first carried out a question instrument test which was carried out on October 9 2023 in Class V of SD Negeri 091626 Bandar Baru, Dagang. When carrying out the instrument test, the researcher first informs the researcher of the objectives, after that the researcher gives the answer sheet and question sheet to the students. The duration of this instrument test was 60 minutes. After carrying out the instrument test, the researcher carried out data input using Microsoft Excel 2010.

So, from the 25 questions after the instrument test was carried out at SD Negeri 091626 Bandar Baru, there were 20 valid questions and 5 invalid questions, so that the questions distributed had a total of 20 valid statements.

#### 2. Implementation Instrument

Description of the observation sheet on the implementation of the *Problem Based Learning learning model* at meetings I and II of experimental class IV UPTD Pilot State Elementary School which was observed by the teacher to see the implementation of the learning process using the *Problem Based Learning learning model* on students' Science Process Skills. So the results of implementation observations can be obtained which can be seen through the table, namely as follows:

**Table 2 Results of the Implementation Observation Sheet in the *Problem Based Learning Model***

Meeting	Score Earned	Highest Score	% Implementability	Criteria
1	14	16	87.5 %	Very good
2	16	16	100%	Very good
Average	15	16	93.75%	Very good

The model carried out by observations at the first meeting obtained a percentage of 87.5% and the second meeting obtained a percentage of 100%. It can be seen from the two meetings that an average score of 93.75% was obtained in the very good category, so it can be concluded that the treatment with the Problem Based Learning learning model in the experimental class went very well.

**Data Analysis Technique**

In this normality test, to determine whether the data is normally distributed or not, use the IBM SPSS Statistics 26 software program and the normality test used is Kolmogorov Smirnov. More details can be seen from the table of normality test data results for the pretest-posttest data for control class IV B and the table for experimental class IV A, namely as follows:

**Table 3 Results of Normality Test Data Pretest-Posttest Data for control class IV B and Experimental Class IV A**

		Tests of Smirnov			
		Kolmogrov-Smirnov			
Students' Science Process Skills	Class	Df	Sig	$\alpha$	Information
	Pretest Control Class IV B Conventional Learning Model	30	0.112	0.05	Normal
	Posttest Control Class IV B Conventional Learning Model	30	0.183	0.05	Normal
	Pretest Experimental Class IV A Problem Based Learning Model	30	0.072	0.05	Normal
	Pretest Experimental Class IV A Problem Based Learning Model	30	0.180	0.05	Normal

Based on the significance level  $\alpha = 0.05$  with the criteria that if  $L_p > 0.05$  then the distribution is normal and if  $L_p < 0.05$  then the distribution is not normal. From the normality test table above, it can be concluded that the control class pretest data has a sig of  $0.112 > 0.05$  with a normal distribution and the control class posttest has a sig of  $0.133 > 0.05$  with a normal distribution. The pretest data for the experimental class has a sig of  $0.153 > 0.05$  with a normal distribution and the posttest for the experimental class has a sig of  $0.134 > 0.05$  with a normal distribution. Thus the pretest and posttest for both classes were normal because they met the criteria.

## 2. Homogeneity Test

After the two samples were declared to be normally distributed, the next step was to carry out a homogeneity test using the IBM SPSS Statistics 26 software program. In the homogeneity test, only the posttest of both classes was tested with the aim of finding out that the posttest data for control class IV B and the posttest for experimental class IV A had homogeneous variants. after being given treatment. The results of the homogeneity test data which can be seen from the table are as follows:

**Table 4 Homogeneity Test Data Results Posttest Data for Class IV B and Class IV A**

		Test of Homogeneity of Variance
		Sig
<i>Posttest</i> Class IV A and IV B	Based on Mean	0.875
	Based on Median	0.798
	Based on Media and with adjusted df	0.798
	Based on trimmed mean	0.884

Based on the table in above it can be concluded that the *posttest data* for control class IV B and experimental class IV A can be seen from *the Based on Mean* , namely  $0.875 > 0.05$ . So the students' Science Process Skills data in *the posttest* for both samples had homogeneous variance.

## 3. Hypothesis Testing

This hypothesis test uses the IBM SPSS Statistics 26 software program. For more details, you can see from table 4.9 the results of the *pretest* and *posttest hypothesis test data for experimental class IV A* , *Problem Based Learning* learning model , which are as follows:

**Table 5 Results of Hypothesis Data for Experiment Class IV A Problem Based Learning Model**

Paired Samples Test						
	Mean	Std. Deviation	A	T <sub>count</sub>	T <sub>table</sub>	Sig (2-tailed)
Problem Based Learning Model for Students' Science Process Skills	10,667	2,072	0,05	5,147	1,697	0,00

If  $H_a: t_{\text{calculate}} > t_{\text{table}}$  with a significance level of 0.05 then  $H_0$  is rejected and  $H_a$  is accepted.  $t_{\text{count}}$  5.147 and  $t_{\text{table}}$  1.697 means  $5.147 > 1.697$  so that  $H_0$  is rejected and  $H_a$  is accepted, meaning that there is an influence of the Problem Based Learning (PBL) model on the Science Process Skills (KPS) of students at UPTD SD Negeri Pilot

### Discussion

From the research results, it can be seen that the Problem Based Learning model can improve students' Science Process Skills. Where the experimental class IV A using the Problem Based Learning learning model has an average pretest and posttest score of 43.61% and 80.74%, while the control class IV B using the Conventional learning model has an average pretest and posttest score of 41.39% and the average posttest score is 70%. So there is a difference in the average value of the Science Process Skills of students who are taught using the conventional learning model. This conventional learning model is too monotonous in the learning process so that it is detrimental to Science Process Skills. By testing the hypothesis in the "t" test with a significance level of 0.05 and  $t_{\text{count}} > t_{\text{table}}$ , it can be concluded that there is an influence on the learning outcomes of students' Science Process Skills at UPTD SD Negeri Perpilotan with a  $t_{\text{count}}$  of  $5.147 > t_{\text{table}}$  1.697 so that  $H_0$  is rejected and  $H_a$  is accepted.

In this research, the Problem Based Learning learning model is able to help students find and solve problems in the learning process regarding students' Science Process Skills at UPTD SD Negeri Pilot, thus creating a teaching and learning atmosphere that is more effective than usual. In implementing the Problem Based Learning learning model, students are faced with a problem and students are required to find their own way to solve it. The Problem Based Learning model system puts emphasis on resolving a problem reasoningly and being able to find answers to every existing learning problem. The learning process using the Problem Based Learning learning model involves students working together to provide new ideas with the aim of strengthening students' memory and creativity in order to gain a basic understanding of the material presented and improve students' Science Process Skills. Thus, the data obtained in the analysis of this research shows that there are many differences in using the Problem Based Learning learning model, starting from student activity to tests on students' Science Process Skills learning outcomes, thus showing that the Problem Based Learning learning model used for experimental classes is better than the learning model. Conventional in the control class, especially on material forms of substances and their changes.

## Results of the Implementation of the Problem Based Learning Model

The implementation of the Problem Based Learning learning model on students' Science Process Skills learning outcomes was carried out during 2 meetings. Based on the learning activities carried out, there is a syntax for the Problem Based Learning learning model on the implementation sheet. So that the final score for meeting I was 87.5% with very good criteria, meeting II was 100% with very good criteria. The average number obtained from 2 meetings was 93.75% with very good criteria. So the learning process using the Problem Based Learning learning model is carried out well and the Problem Based Learning learning model can provide opportunities for students to be more active in learning.

## CONCLUSION & RECOMMENDATION

Based on the results of the research data, the researcher can conclude that the use of the Problem Based Learning model has a significant effect on students' science process skills in material on the forms of substances and their changes in class IV UPTD SD Negeri Pilot FY 2023/2024. This can be proven by the results of the research which includes the average value of student test data using questions designed based on the Science Process Skills indicators and the results of the "t" hypothesis test carried out. From the "t" hypothesis test, the tcount value is 5.147 which is greater than the ttable of 1.697 and if we look at the significant conditions in the hypothesis test, if  $H_a: t_{count} > t_{table}$  with a significance level of 0.05 then  $H_0$  is rejected and  $H_a$  is accepted. This means that the influence of the Problem Based Learning learning model on students' Science Process Skills was also identified from the results of observations made. Where the average observation results based on indicators of students' Science Process Skills in the experimental class obtained a percentage of 93.75% in the very good category, it can be concluded that there is an influence of the Problem Based Learning (PBL) learning model on students' science process skills in the material. the form of substances and their changes in class IV A UPTD of SD Negeri Pilot FY 2023/2024, so that the hypothesis in this research is accepted.

From the research above, it can be concluded that there has been a significant increase in student learning outcomes by 80% in material on the form of substances and changes in class IV UPTD of Pilot State Elementary School using the Problem Based Learning model. This research is supported by previous researchers conducted by Beatrix (2019), Emrisena (2022) and Singgih (2016). Based on previous researchers using the same model, the discussion above in this research shows the influence of the Problem Based Learning model on students' science process skills. This model can be applied at the UPTD of Pilot State Elementary School to improve students' science process skills, especially in the matter of forms of matter and their changes.

## ADVANCED STUDENTS

Based on this research, the researcher provides suggestions according to the results of the research that has been carried out as follows:

- a. For teachers, teachers should use learning models that are appropriate to the material being taught so that students are more active and motivated in learning activities and can improve students' science process skills.
- b. So that students are more active during the learning process, the teacher acts as a facilitator who encourages students to carry out learning activities. Teachers position themselves as guides in the course of learning discussions so that students are more active in learning.

- c. For future researchers who wish to carry out the same research, it is recommended to develop this Pilot State Elementary School UPTD research by preparing other material presentations that can improve students' science process skills better.
- d. For students, research on the influence of the Problem Based Learning (PBL) model on students' science process skills helps provide knowledge and information that can be used during teaching practice.

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