



How Are Student Learning Results Impacted by the Model of Problem-Based Learning?

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Abstract. The purpose of this study is to ascertain how the PBL model's affects on student learning outcomes on energy source material in grade 4 SDN Sunggapan. The method used in this study is a quasi-experimental quantitative. The population in this study were 4th graders at SDN Sunggapan. The analysis of this study used the Independent sample t test. Based on the data output of the independent sample T test using SPSS 22, The typical student learning outcomes in the PBL-using experimental class in teaching and learning process activities and the control class using the conventional learning model (lecture) are different, as is known from the sig. (2-tailed) values of 0.26 and $0.27 > 0.05$, which indicates that H_0 is rejected and H_a is accepted. Then the application of the PBL paradigm has a major impact on student learning results. This shows that learning on energy source materials in grade 4 SDN Sunggapan using the PBL model is more effective with a class average of 79.20 compared to using the lecture method with a class average of 74.80.

Keywords: PBL · learning outcomes · energy sources

1 Introduction

Education is the most important part in developing the country's development. Because with education, quality human beings can be formed. Efforts to make national education require good quality education. To accomplish the objectives of national education, multiple educational components are combined in an integrated way. The purpose of education is inseparable from the learning process in the classroom, and only good learning from students and schools can achieve educational goals. There are two types of learning, namely internal and extern [1].

Intrinsic types include physical types, namely health and disability, as well as psychological factors including intelligence, concentration, ideals, potential, learning achievements, maturity and disability. External types that affect learning include the family, school and community environment [1, 2].

Learning achievement is very important in student learning activities. And learning will certainly affect the academic or academic success of children in the future. Implementation of the learning process, some things can affect learning outcomes. Based on this, it can make students improve their questioning skills, think scientifically, and find

learning outcomes according to evidence [3]. The focus of teaching science in elementary schools should foster the desire and development of students in line with their own lives. Learning techniques play a very important role in learning activities. Learning strategies are the basic design of how educators bring teaching into the classroom.

The challenge and the solution to it serve as the primary starting point for problem-based learning. Another benefit of problem-based learning over other learning methods is that problem - based learning forces students to use critical thinking skills when they encounter challenges during learning. With this stage, students are expected to be familiar with the problem so that they find solutions for the people around them. Furthermore, through problem based learning, meaningful learning will occur because students simultaneously seek and apply their knowledge in the family and community environment. Looking at the explanation above, the researcher believes that research is needed to find out the positive impact of the problem based learning model on the learning outcomes of 4th grade students of SDN Sunggapan energy material.

Based on the achievements of researchers' observations on February 15, 2022, science learning outcomes were not fully obtained optimally, because students thought science was a difficult and unreal lesson, therefore innovative learning was needed where students were required to study independently and be able to construct cognitive, so that able to improve science learning outcomes [4-6]. Lack of students in finding knowledge and skills in solving problems encountered. Several problem-solving learning strategies are required in order to develop students with strong problem-solving skills. A survey of different academic works revealed that there are numerous problem-solving techniques that can be used in the classroom. Students' science learning outcomes are still less than expected and can be seen from the results of observations of researchers on February 16, 2022 at SDN Sunggapan, showing that some students sitting on the side and behind are still in dialogue with their friends when the teacher is explaining, students are less active and less enthusiastic during education, there are no students who show their hands to respond to problems from the teacher, there are no students who ask questions during education, and the learning area is conducive because the teacher's learning methods are less creative. This is not in accordance with the symptoms of student learning outcomes, namely the desire and willingness to succeed, the encouragement and enthusiasm for learning, the appreciation in learning, the existence of activities that are not boring in learning, and the existence of a conducive environment that allows a student to be able to study well. There is also a class IV at SD Negeri Sunggapan. This is related so that the researchers found that class IVA as the control group had 25 students in this research, and class IVB as the experimental group was given treatment and had the same number of students as 25 students.

2 Method

This research employs a quantitative strategy and a quasi-experimental methodology. Experimental research procedures are research procedures used to find the effect of certain treatments [7]. There is also this approach called the quantitative approach because Numbers are used in research information, while statistics are used in analysis. This research was carried out at SD Negara Sunggapan, Cikembar District, Sukabumi

Regency, the objects of this research were students in grades IVA and IVB of SD Negara Sunggapan.

25 students are enrolled in Class IVA, while 25 students are enrolled in Class IVB. Researchers select these objects based on the needs of the researchers themselves and based on the atmosphere and condition of the school with the aim of making it easier for researchers to implement them because students in grades IVA and IVB have sufficient descriptions and are more active and effective for the needs of this research compared to lower classes.

Population is an area of generalization in which it consists of certain characteristics or qualities that have been inaugurated by researchers so that they can be studied [8, 9]. The total research population of Sunggapan Elementary School students was 274 students. The collection techniques used are observation, interviews, and tests.

3 Result and Discussion

The research instrument applied in student pre-test and post-test question sheets in the form of multiple choice then distributed to pupils in the control class and the experimental class. The research instrument was first tested for validation, namely content validity and construct validation which was carried out at SDN Ciabad. The research instrument was in the forms of student pre and posttest question sheets in the form of multiple choice then distributed to students in the control and experimental classes class. The research instrument was first tested for validation, namely content validity and construct validation which was carried out at SDN Ciabad Since the normalcy test's significance value is $0.115 > 0.05$, it is clear that the residual value is regularly distributed.

The Paired Sample T Test was the next analysis employed after the normality test. Based on the assumption that the data is evenly distributed, the Paired Sample T Test compares the differences between the means of two paired samples. Each variable is collected using paired samples from the same person under various conditions. pre- and post-test sample T test data pairing. The following conclusions were drawn from the findings of our investigation.

The following forms the decision-making framework for the analysis of the paired t test, according to the substantial value (sig.) of the SPSS output results: The pre-test (x) value has an impact on the post-test score if the significant level (sig.) is smaller than the probability of 0.05. (y). On the other hand, if the significance value (sig.) is greater than 0.05, it means that there is no effect of the pretest (x) value on the post-test (y) value.

Based on the data output of the paired sample T test using SPSS 22 above, it is known that a significance values of $0.001 < 0.05$ indicate a significant difference between the final variable and variables (pre-test and post-test), this indicates a significant effect on the difference in treatment. to each variable.

The research was then continued by testing the normality of the pre and post test values of the control class. If the test shows significant results ($p < 0.05$), then our data is not normal. However, if the test shows insignificant results ($p > 0.05$), then there is no difference between our data and ideally normal data, in other words our data is normal (Fig. 1).

Independent Samples Test

		Levene's Test for Equality of Variances		t-Test for Equality of Means						
		F	Sig.	T	Df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
hasil belajar	Equal variances assumed	.037	.849	-2.294	48	.026	-4.400	1.918	-8.257	-.543
	Equal variances not assumed			-2.294	45.099	.027	-4.400	1.918	-8.263	-.537

Fig. 1. Output SPSS

The significant value (sig.) of the SPSS output findings is used as the basis for judgement in the analysis of the independent t test, and the results are: If the sig. (2-tailed) value is greater than 0.05, H0 is accepted and Ha is rejected, indicating that there is no difference between group A and group b's average student learning outcomes.

The average student learning outcomes for groups A and B differ from one another if the sig. (2-tailed) value is less than 0.05, which leads to the rejection of H0 and the acceptance of Ha. Based on the results of the independent sample T test run above using SPSS 22, the sig value is known. There is a difference between the class using the traditional learning paradigm and the average student outcomes and the experimental class using the PBL model in teaching and learning activities, according to the 2-tailed statistics of 0.26 and 0.27, which show that H0 is rejected and Ha is accepted.

The PBL paradigm has a favorable and significant impact on students' learning outcomes in the resource module in grade 4 SDN Sunggapan, according to the research findings. The outcomes of the information analysis prior to the application (pre-test) showed that the scores on the power source module were remained low in both the control class and the experimental class. This can happen because the ongoing education is still using the conventional model (lectures). Educational activities that use the lecture model make students less likely to find opportunities to be active in learning activities because all stages of education are centered on the teacher.

Experimental activities are also not attempted in education. Procedures for lectures and observing just a photo are very often used by teachers in education. The post test results show that Using the lecture model, the average value in the experimental class is higher than the average value in the control class. Accordingly, it is possible because problem-based learning makes use of real-world issues to help students develop their problem-solving abilities and knowledge. Through experience or learning through experience, students actively participate in the learning process.

The position of the teacher in problem-based learning acts as a facilitator. The teacher did not deliver the modules in large numbers, but the teacher introduced real cases related to natural events that had occurred. From the real case, it was raised into an experiment. In the experiment students participate in analyzing problems and investigating to find solutions.

The teacher makes small groups so that students can work together in their learning area. Through these groups students can identify, analyze and create solutions to deal with natural events. The last activity that students must do is make reports and present.

Experimental and presenting activities that can encourage students' practicing and communicating skills so that both aspects face a large increase in score. The existence of dialogue and collaboration activities can certainly improve social communication skills. Students are not only able to carry out investigations but are also able to practice their skills in everyday life, especially in finding solutions to cases experienced in real life.

Problem - based learning is not only to urge students to pursue their position through real problems that are directed and urged to become independent students. Problem - based learning affects the skills to learn independently [10, 11]. This means that students are more active and can learn independently through problem - based learning. The application in problem - based learning has the character of supporting investigation and freedom of thought. The existence of a collaborative process in problem - based learning makes students combine comments to master the educational module through investigation activities so that students gain knowledge and then deliver results. This certainly affects students' process skills in the aspects of practicing and communicating students.

Some of the advantages of problem - based learning include empowering students to identify, create and use appropriate energy sources; actively participate in integrating data and expertise from various disciplines; Knowledge and learning strategies tend to be transferred and transferred to other learning environments and develop the communication skills and social skills needed for teamwork and teamwork. The application of the problem - based learning model in delivering lesson modules always begins with the provision of real problems after which the real cases are raised into an experiment. For learners, problem-based learning offers opportunity to learn independently and gain experience.

Problem-based learning has the advantage of using actual issues as a teaching environment for students to obtain understanding of important ideas and crucial concepts, as well as to learn about critical thinking and problem-solving skills from lesson modules. This way, students get used to working methodically and sequentially so that skills analysis students can increase their understanding of the material. In the educational process using a problem - based learning model, students share opportunities to learn through experience by conducting experiments. Teachers who have taught with PBL have more significant professional development, higher pedagogical understanding and lower perceived costs than teachers who do not use PBL [12].

Concepts will be stored longer in memory if students not only see and hear but also practice. Students will find it easier to remember the modules taught. Thus, through problem-based learning, students can improve their skills in remembering. The results of the research confirm that the problem - based learning model has a positive and significant influence on student learning outcomes in the resource module in grade 4 SDN Sunggapan. This is because the problem-based learning model uses real cases as the starting point of education. Problem - based learning, focuses on presenting a case (real-stimulus).

Cases become the focus, stimulus, and guide for the learning process, while the teacher becomes a facilitator and guide. Students acquire the skills and knowledge needed in the process of finding solutions to these problems. In this process students are responsible for their own education because that skill is what students need. Students practice what is already known, create what needs to be known, and learn how to obtain the necessary data through various sources and convey universal conclusions about their findings.

The process of solving or finding the solution of a problem in problem - based learning uses the steps of the scientific procedure. Thus students learn systematically and planned. Therefore, the use of problem - based learning can share the learning experience of doing excellent scientific work to students. Problem - based learning gives students the opportunity to carry out experiments by facing and convincing themselves of a problem or hypothesis so as to make students creative and independent both individually and in groups to practice and improve their students' scientific skills.

The problem - based learning model does not only receive data from the teacher. Problem - based learning gives students the opportunity to plan and participate in investigating a problem. Activities put students in the position of proposing, observing, classifying, practicing, predicting, interpreting, and communicating. Characteristics of problem - based learning more refer to the flow of constructivist learning, where learning is an active process of education to build knowledge. The active process is defined not only mentally but also physically.

Problem - based learning can have an impact on skills and learning outcomes according to some of the advantages of problem - based learning, including empowering students to identify, create and use appropriate energy sources; actively participate in integrating data and expertise from various disciplines; Knowledge and learning strategies tend to be transferred and transferred to other learning environments and develop communication skills and social skills needed for teamwork and teamwork [7]. Students are involved in dismantling problems, students feel they have a role in efforts to create solutions to existing problems. Through this description, students' understanding develops to carry out real actions in dismantling the problems given by the teacher.

4 Conclusion

Based on the results of the data analysis from the test results of students in the control class and experimental class, Using the PBL Model for Problem-Based Learning, it can improve student learning outcomes on energy source material in grade 4 SDN Sunggapan. The analysis of this study used the Independent sample t test.

The experimental class's average student learning outcomes differ from those of the control group using the PBL model in teaching and learning activities and the control group (n) using the conventional learning model (lecture), according to the data output of the independent sample T test using SPSS 22. The sig. (2-tailed) are 0.26 and 0.27 > 0.05, meaning that H_0 is rejected and H_a is accepted. Then the application of the PBL paradigm has a major impact on student learning results. This shows that learning on energy source material in grade 4 SDN Sunggapan using the PBL model is more effective with a class average of 79.20 compared to using the lecture method with a class average of 74.80.

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