



Problem Based Learning Model Based on Tat Twam Asi for Understanding Natural Science Concepts

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ABSTRAK

Sains dapat menjadi bekal bagi peserta didik dalam menghadapi berbagai tantangan di era global. Penelitian ini bertujuan untuk menguji pengaruh model pembelajaran Problem Based Learning (PBL) berbasis Tat Twam Asi terhadap pemahaman Konsep IPA siswa kelas V. Penelitian ini merupakan penelitian eksperimen semu (quasi experiment) dengan rancangan non-equivalent post-test only control group design. Populasi dalam penelitian ini adalah seluruh siswa kelas V. Sampel penelitian ini dengan teknik simple random sampling. Sampel penelitian ini yaitu siswa yang berjumlah 36 orang sebagai kelompok eksperimen. Data penelitian dikumpulkan menggunakan metode tes dengan instrumen tes objektif untuk mengukur pemahaman konsep IPA. Data yang diperoleh dianalisis dengan menggunakan statistik deskriptif dan statistik inferensial (Uji-t). Hasil penelitian menunjukkan bahwa terdapat perbedaan pemahaman konsep IPA antara siswa yang mengikuti model pembelajaran Problem Based Learning (PBL) berbasis Tat Twam Asi dan siswa yang tidak mengikuti model pembelajaran Problem Based Learning (PBL) berbasis Tat Twam Asi pada kelas V. Hal ini diketahui bahwa model pembelajaran model pembelajaran Problem Based Learning (PBL) berbasis Tat Twam Asi memiliki pengaruh yang signifikan terhadap pemahaman konsep IPA siswa kelas V.

ABSTRACT

Science can be a provision for students to face various challenges in the global era. This research aims to test the effect of the Problem-Based Learning (PBL) learning model based on Tat Twam Asi on the understanding of science concepts for class V students. This research is a quasi-experimental research with a non-equivalent post-test-only control group design. The population in this study were all class V students. The sample for this study used a simple random sampling technique. The sample for this research was 36 students as the experimental group. Research data was collected using the test method with objective test instruments to measure understanding of science concepts. The data obtained were analyzed using descriptive and inferential statistics (t-test). The results of the research show that there is a difference in understanding of science concepts between students who follow the Problem-Based Learning (PBL) learning model based on Tat Twam Asi and students who do not follow the Problem-Based Learning (PBL) learning model based on Tat Twam Asi in class V. It is known that The Tat Twam Asi-based Problem Based Learning (PBL) learning model has a significant influence on fifth-grade students' understanding of science concepts.

1. INTRODUCTION

At elementary school level, natural science or science is one of the subjects that plays an important role in education. This is because science can be a provision for students to face various challenges in the global era (Haqiqi, 2019; Vashti et al., 2020). The aim of science is to develop knowledge and understanding of science concepts that are useful and can be applied in everyday life. To realize the goals of science learning in schools, science teachers should understand the nature of science, be able to become facilitators in learning and be able to create learning that suits the abilities and needs of their students as has been designed in the curriculum (Y. Lestari, 2018; Permana & Damiri, 2014). This goal has not been achieved optimally because there are still many problems in science learning (Januarisman & Ghufro, 2016; Yuliati & Lestari, 2019). Currently, one of the problems in education is understanding science concepts. This is in line with the opinion which states that there is a lack of education that applies concepts to science learning

(Vashti et al., 2020; Yuliati & Lestari, 2019). Based on research carried out, the emphasis in science learning is providing direct experience to develop the ability to explore and understand the natural surroundings using a scientific approach.

From the results of observations and interviews, several problems were found, namely: First, the breadth of the subject matter causes the learning process to be more likely to use the lecture method so that learning is teacher-centered. This happens because the Problem Based Learning (PBL) learning model has not been implemented (Helmi, 2016; Ni'mah & Dwijananti, 2014). Second, in the learning process, students have not been given the opportunity to work in groups which results in students being less active in the learning process. Third, students have not been given the opportunity to carry out investigations in solving problems in the learning process, so students only wait for information from the teacher without carrying out direct investigations regarding the subject matter. Fourth, the learning process is not linked to concrete things, for example local wisdom in the region, especially Bali, which causes teacher interactions with students to be poor. Fifth, some students still lack discipline when participating in learning so that students cannot answer questions given by the teacher. They have their own activities, some play and disturb their friends. This happens because there is no organization of students to learn to understand the problems and tasks given during the learning process (Hanifah et al., 2019; N. Lestari et al., 2022). Based on previous research measuring learning outcomes, the average value of PTS Science for Class V students in Gugus III, Kubu District, Karangasem Regency, it is known that the KKM value of a total of 185 students is still 107 students have not reached the KKM, while the average value of understanding science concepts Class V students at Gugus III Elementary School, Kubu District, Karangasem Regency are in the range 34.00 – 67.11 (Septia et al., 2022; Yuliana, 2018). If converted to the benchmark reference assessment scale (PAP), this range is in the low category. This indicates that the average PTS science score for class V students at Gugus III Elementary School, Kubu District, Karangasem Regency, can be classified as still low in understanding science concepts.

An alternative that can be done to improve students' reasoning abilities is by providing problems that refer to high-level thinking processes. In this case the teacher must use a learning model that can facilitate science learning. One learning model that can be applied is the Problem Based Learning (PBL) model. The Problem Based Learning (PBL) learning model requires students to work together in groups to find solutions to problems faced through group investigations and presenting the results of efforts to find these solutions (Astuti, 2019; Suari, 2018). The Problem-Based Learning (PBL) learning model is learning that is delivered by presenting a problem (Fadillah et al., 2020; Liu & Pásztor, 2022; Ramadhan, 2021). Problem Based Learning (PBL) is able to change the learning process into a student center so that students learn to be more active, critical and able to relate learning to students' real lives so that learning becomes more effective (Dwi et al., 2013; Hendriana et al., 2018). The Problem Based Learning (PBL) learning model requires students to learn to solve problems in the real world in their surrounding environment, oriented towards authentic problems from the student's living environment, so this can stimulate students to think at a higher level (Rahayu & FX, 2015; Suari, 2018).

The Problem Based Learning (PBL) learning model can be combined with local Balinese wisdom, one of which is Tat Twam Asi. By combining the Problem Based Learning (PBL) learning model with Tat Twam Asi, it can provide an accompanying effect. The accompanying effect is the character value that is expected to emerge after the learning process (Anggraeni & PF, 2018; Mukholifah et al., 2020). According to previous research, Tat Twam Asi education can move students to think critically, be responsible and mature students' mental and moral emotions to work together with each other, manage and solve the problems they face every day. Tat Twam Asi education is implemented so that teacher interaction with students can create good communication during the learning process (Hendriana & Jacobus, 2017; Suastini & Suarjaya, 2021). Based on this description, there has been no study regarding the Problem Based Learning (PBL) Learning Model Based on Tat Twam Asi on the understanding of Science Concepts for fifth grade elementary school students. The aim of this research is to test the effect of the Tat Twam Asi-based Problem Based Learning (PBL) learning model on the understanding of science concepts for fifth grade students at SD Gugus III.

2. METHOD

This research is experimental research because it uses a cause and effect relationship by involving a control group and an experimental group. In the research that will be carried out, it is not possible to control/manipulate all variables. This research includes quasi-experimental research (quasi experiment) (Imelda et al., 2019; Prahesti & Fauziah, 2021). This study used a non-equivalent post-test only control group design. The data collection method used in this research is the multiple choice test method. A test is a systematic tool or procedure in the form of questions or tasks to measure student behavior. The test

method is carried out by giving students a number of tests or detailed questions to measure understanding of science concepts in class V of SD Gugus III, Kubu District, Academic Year 2022/2023. The data analysis used in this research consists of data processing and statistical analysis. Data obtained from research results were analyzed using descriptive statistical analysis and interventional analysis (Ahmad & Muslimah, 2021; Anzar & Mardhatillah., 2017). The data collected in this research is the scientific literacy and understanding of science concepts of class V students. The analysis used to analyze one independent variable (Problem Based Learning learning model based on Tat Twam Asi) against one dependent variable (understanding of science concepts) is by using the Test- t.

3. RESULT AND DISCUSSION

Result

Research regarding the experimental group's understanding of science concepts was obtained through a posttest on 36 students. This research was carried out from March 7 - 25 in 7 meetings. The posttest results obtained by the range of post-test scores for the experimental group were 16. K (interval class) 6.15. P (class length) 2.6 is rounded to 3. Based on the calculation results, the interval number or interval class length is determined to be 4 and the number of classes is 6. It can be described that the mean of the experimental group's post-test score is 79.75. The median post-test score of the experimental group was 79.1. The mode of the experimental group's post-test score was 77.9. The standard deviation (SD) of the science concept understanding data for the experimental group was 3.83. Based on research that has been carried out, it is known that the mean is 79.75, while the median is 79.1 and the mode is 77.9. To determine the quality of the variable, the average value is conventionalized using five scale criteria. Data on understanding science concepts is converted using the ideal average (Mi) and standard deviation (SDi) criteria. It was found that the average understanding of science concepts in the Experimental group with $M = 79.75$ was in the very high category in the range $75 \leq M \leq 100$.

Research regarding the control group's understanding of science concepts was obtained through a posttest on 36 students. This research was carried out from March 7 - 25 in 7 meetings. The results of the posttest are carried out by analysis or calculation. R (Range) of the control group's post-test score is 16. Class interval of the control group's post-test score is 6.15 Determining P (class length) $P = 2.6$ rounded to 3. Based on the calculation results, the interval number is determined or the length of the class interval is 4 and the number of classes is 6. The frequency distribution and posttest results of the control group are presented in table 5 below. From the frequency distribution table that has been created, the mean (M), median (Md), mode (Mo) can be described. The mean of the control group's post-test score was 68.58. The median of the control group's post-test score was 68.2. The mode of the control group's post-test score was 67.3. To facilitate observation and understanding of the distribution of mean, median and mode values, they can be depicted on a polygon graph as in Figure 2. Below. Based on the polygon graph in Figure 2, it is known that the mean is 68.58 while the median is 68.2 and the mode is 67.3. To determine the quality of the variable, the average value is conventionalized using five scale criteria. Data on understanding science concepts is converted using the ideal average (Mi) and standard deviation (SDi) criteria. It was found that the average understanding of science concepts in the Experimental group with $M = 68.58$ was in the high category in the range $58 \leq M \leq 75$. The normality test for data distribution used the Kolmogorov-Smirnov and Shapiro-Wilk formulas with the help of the SPSS 25 for Windows program. The results of the normality test can be seen in Table 1.

Table 1. Recapitulation of Data Distribution Normality Test Results Using Kolmogorov-Smirnov

		N	Unstandardized Residuals
			72
Normal Parameters a, b	Mean		0.0000000
	Std. Deviation		3.55897112
Most Extreme Differences	Absolute		0.122
	Positive		0.122
	Negative		-0.120
Statistical Tests			0.122
Asymp. Sig. (2-tailed)			0.010c
Sig.			0.227d
Monte Carlo Sig. (2-tailed)	Lower Bound		0.216
	Upper Bound		0.237
99% Confidence Interval			

With the normality test using Kolmogorov-Smirnov according to the table, the results of the analysis show that the overall significance value from the Kolmogorov-Smirnov calculation obtained a significant value of $0.227 > 0.05$, so the data is said to be normally distributed. The homogeneity of variance test used is Levene's test of Equality of Error Variance. Data is said to have homogeneous variance if the probability value is more than 0.05. And the data is said to be non-homogeneous from the population if the significance of the results is less than 0.05 (Ahmad & Muslimah, 2021; Anzar & Mardhatillah., 2017). The homogeneity test results can be seen from Table 2.

Table 2.Levene's Test of Equality of Error Variance Test Results

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Concept Understanding	Equal variances assumed	0.2780	.6001	13.053	70	0.000	11.028	0.845	9.343	12.713
	Equal variances not assumed			13.053	69.778	0.000	11.028	0.845	9.343	12.713

By using the homogeneity test using Levene's Test of Equality of Error Variance according to the table, the analysis results show that the overall significance value of the product moment correlation calculation has a significant value of $0.600 > 0.05$, so the data is said to be homogeneous. Hypothesis testing uses the t-test with the help of the SPSS 25 for Windows program at a significance level of 5%. Following are the results of the hypothesis analysis in Table 3. Based on the results of the t-test with the help of SPSS 25 for Windows, the significance results were obtained at $0.000 < 0.05$, so that H0 was rejected and H1 was accepted.

Table 3. T-test Hypothesis Results

		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Concept Understanding	Equal variances assumed	0.78	0.600	13.053	70	0.000	11.028	0.845	9.343	12.713
	Equal variances not assumed			13.053	69.778	0.000	11.028	0.845	9.343	12.713

Discussion

In this study, what was compared were: (1) understanding of science concepts of students who followed the Tat Twam Asi-based Problem Based Learning (PBL) learning model, (2) understanding of science concepts of students who did not follow the Tat Twam-based Problem Based Learning (PBL) learning model Asi. This refers to the results of hypothesis testing and data analysis that has been carried out. From the data analysis that has been carried out, the Problem Based Learning (PBL) learning model based on Tat Twam Asi has an effect on students' understanding of science concepts. The implementation of the Problem Based Learning (PBL) learning model based on Tat Twam Asi has an impact on student learning outcomes which become more quality, genuine and long-lasting because students experience direct, active and participation by involving their feelings, thoughts and skills. Apart from that, students also think critically and productively because they really experience the learning themselves. The Problem Based Learning (PBL) learning model based on Tat Twam Asi also produces high student thinking competence. This is also in line with the results of research which obtained results namely that the ability to understand concepts and critical thinking abilities of students who received treatment with the Problem

Based Learning (PBL) learning model were significantly better and higher (Suhendar & Ekayanti, 2018; Yulianti & Gunawan, 2019).

There is a significant influence between students who follow the Problem Based Learning (PBL) learning model based on Tat Twam Asi and students who do not follow the Problem Based Learning (PBL) learning model based on Tat Twam Asi in class V at Gugus III Elementary School, Kubu District, Karangasem Regency. Academic year 2022 /2023. In line with research which states that the Problem Based Learning learning model has a positive effect on understanding concepts (Nomleni, FT & Manu, 2018; Suhendar & Ekayanti, 2018). In the learning implementation plan (RPP) that has been implemented by the teacher, the first phase is orienting students to the problem. In this phase, what the teacher must do is provide apperception to the students by asking questions about the problems to be studied. In this phase students can also identify problems from phenomena given by the teacher. Providing apperception at the beginning of learning is very important because providing apperception will affect the cognitive structure of students so that they focus on something to be studied. This activity can be carried out based on aspects of Tat Twam Asi, namely paras-paros and salunglung sabayantaka. The aspect of understanding the concept that can be developed is the explaining aspect. In this phase, students identify possible answers by looking for answers from an experience they have had. Students only provide basic explanations and provide examples to clarify answers (Rahman, 2013; Suhendar & Ekayanti, 2018).

The second phase is organizing students to study. In this phase, students are divided into several heterogeneous groups to discuss and divide tasks to find data and materials needed to solve problems. Students will look for the most appropriate source to answer the problem. Curiosity is the initial capital for students in the learning process. With high curiosity, students will learn more to fulfill their thirst for knowledge. Through curiosity, students will begin to learn and discover (WS Anggraeni et al., 2021; Zaini & Dewi, 2017). This activity can be carried out based on the Tat Twam Asi aspect, namely joy and sadness and mutual nurturing, compassion, nurturing. Aspects of conceptual understanding that can be developed are aspects of classifying, drawing inferences and interpreting.

The third phase is assisting independent and group investigations. The teacher's role is to guide students to collect appropriate information, carry out experiments, look for explanations and solutions. Learning through discussion is mastering learning content through a vehicle for exchanging opinions based on knowledge and experience gained in order to solve a problem. From the assumptions of their group friends as well as encouragement and guidance from the teacher, students will be required to be able to gather real information through experience and experimentation. This activity can be carried out based on the Tat Twam aspects of joy and sorrow and mutual nurturing, compassion and nurturing. Aspects of conceptual understanding that can be developed are aspects of classifying, drawing inferences, exemplifying and interpreting (Saputra & Mujib, 2018; Suhendar & Ekayanti, 2018).

The fourth phase is developing and presenting the work and exhibiting it. In this phase students will present the results of discussions to produce problem solving solutions. This activity can be carried out based on aspects of Tat Twam paras-paros and salunglung sabayantaka. Aspects of conceptual understanding that can be developed are aspects of explaining, classifying and drawing inferences. Another group identifies the work of the presenting group. If there are different answers, other groups may ask questions and convey their group's answers. Students will debate each other's answers to provide further explanation (Amin, 2017; Pratama & Saregar, 2019).

The fifth phase is analyzing and evaluating the problem solving process. In this phase, other groups give appreciation and the teacher helps students reflect or investigate and the processes they use. This activity can be carried out based on the Tat Twam paras-paros aspect and mutual nurturing, compassion and nurturing. Aspects of conceptual understanding that can be developed are aspects of explaining and drawing inferences. If the answer is deemed inappropriate because of the tone of new assumptions from other students, if the answer is still not correct then the teacher has the task of straightening out the answer so that students have correct and complete knowledge as an initial concept for students (Irwandani, 2015; Nugraha et al., 2019).

The successful implementation of the Problem Based Learning (PBL) learning model based on Tat Twam Asi is supported by research conducted that shows the influence of the Problem Based Learning (PBL) model on critical thinking skills and understanding of science concepts in fifth grade students at SD N 30 Sumpahbita, Bolocci District., Pangkep Regency. So based on the discussion above, there is an influence of the Tat Twam Asi-based Problem Based Learning (PBL) learning model on elementary students' understanding of science concepts.

4. CONCLUSION

The results of data analysis show that there is a difference in understanding of science concepts between students who follow the Problem Based Learning (PBL) learning model based on Tat Twam Asi and students who do not follow the Problem Based Learning (PBL) learning model based on Tat Twam Asi. It was concluded that the Problem Based Learning (PBL) learning model based on Tat Twam Asi can improve understanding of science concepts in elementary school students. The application of the PBL learning model based on Tat Twam Asi makes students more active in participating in learning and can build their own knowledge through experience.

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