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The Effect Of The Problem Based Learning Model On Students' Reasoning Abilities In Solving Story Problems On The SPLDV Material For Grade VIII

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Abstract

The purpose of this study was to determine the effect of the Problem-Based Learning Model on students' reasoning ability in solving story problems in class VIII at the UPTD of SMP N 2 Pematang Siantar. The study used a pre-experimental design with classes VIII-8 as subjects, and the author employed a quantitative approach. The design used by the researcher was a One-Shot Case Study. Based on the results of data analysis and discussion, it can be concluded that the use of the Problem-Based Learning Model has a positive and significant effect on students' reasoning ability in solving story problems in class VIII at the UPTD of SMP N 2 Pematang Siantar in the 2025/2026 academic year. A positive influence is shown through the regression equation where Y = 40.826 + 1.168 where the b value = 1.168. This influence is shown through the T-Test with Tcount > Ttable (3.926 > 1.701) or (sig.) < 0.05 (0.000 < 0.05) then Ho is rejected and Ha is accepted which means there is a positive and significant influence of the Problem Based Learning Model on Students' Reasoning Ability in solving story problems on the SPLDV material. The contribution of variable X (Problem Based Learning Model) to variable Y (Student Reasoning Ability) is 67.4%.

Keywords : Learning Model, Problem Based Learning, Student Reasoning Ability

INTRODUCTION

Education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have spiritual religious

strength, self-control, personality, intelligence, noble morals, and the skills needed by themselves and society. (Puspita et al., 2018). Therefore, the government is striving to improve the quality of education in Indonesia. One of the efforts the government has made is by establishing a curriculum. The curriculum is a plan and arrangement regarding the objectives, content, and learning materials, as well as the methods used as guidelines for organizing learning activities to achieve specific educational goals, particularly in mathematics learning.

Mathematics is a compulsory subject taught to all students to equip them with logical, analytical, systematic, critical, and creative thinking skills. One of the goals of mathematics learning in schools is to train students to think and reason in drawing conclusions. According to Siti Sarmiati Kadir, Anwar Bey, and Utu Rahim (AK Sari & Handini, 2023), mathematics is one of the subjects included in the school curriculum from elementary school to high school. The mathematics learning process is considered successful if students are able to understand and master the mathematical concepts taught. Mathematics is one of the subjects that students still consider difficult, even though it is a core subject taught from elementary school to university.

According to NCTM (Wahyuni, Fauziah, Aisyah, & Al-Fayed, 2023) states the general objectives of learning mathematics, namely: (1). Learning to communicate (mathematical communication); (2). Learning to reason (mathematical reasoning); (3). Learning to solve problems (mathematical problem solving); (4). Learning to connect ideas (mathematical connections); (5). Formation of positive attitudes toward mathematics. This indication can be seen from the low desire to learn mathematics for students which makes students' abilities in learning mathematics unsatisfactory. In order for students' abilities to improve, mathematics learning must fulfill the objectives of mathematics learning. Of the five learning objectives above, the focus of this study is reasoning ability.

According to Gaza Ahmad Malik Akbar (Syamsidah & Suryani, 2018) said that reasoning ability is a very important tool for mathematics and also everyday life. So it can be interpreted that students will be able to understand the correct concept in learning mathematics and to spark ideas, students need reasoning ability. In a reasoning ability explained, there are several indicators in reasoning ability according to NCTM (Mahmuzah & Aklimawati, 2015, in Numeracy Journal, stating that if students have obtained mathematical reasoning, if they can: 1) Understand understanding and proof. 2) Implement and analyze mathematical conjectures. 3) Describe and assess mathematical reasons and proof. With the existence of reasoning ability indicators, we can know the extent of a student's ability.

However, the current reality shows that students' reasoning abilities, demonstrated in their mathematics learning outcomes, are still low. This condition is still seen from quantitative learning outcomes, without specifically examining students' mathematical reasoning and communication abilities. The importance of mathematical literacy skills is not

necessarily recognized by Indonesian students in the PISA (Programme for International Student Assessment) study, which is an assessment of 15-year-old students conducted by the OECD (Organization for Economic Co-operation and Development). The 2018 PISA assessment proved that Indonesian students' mathematical literacy skills were still below average compared to other countries, with Indonesian students ranked 73rd out of 79 countries (Devi & Bayu, 2020). Meanwhile, TIMSS results showed that Indonesian students ranked 45th out of 50 countries.

Based on my observations and the results of interviews with mathematics teachers during the PPL at SMP NEGERI 2 Pematangsiantar, it shows that students' mathematics learning achievement is still low and also the lack of interest in learning students in following the mathematics learning process is still varied. This is also how the students' condition during the learning process takes place, sometimes students' attention is not focused when the teacher explains the material being taught to students. It is also seen that during the learning process there are students who are noisy or chatting with each other, there are also students who do not respond to what the teacher says who seem indifferent and do not pay attention when the teacher explains in front of the class.

Eighth-grade students at SMP Negeri 2 Pematangsiantar have low reasoning skills. This is evidenced by the large number of students who do not meet the established Minimum Completion Criteria (KKM), which is 64. Based on the reasoning ability indicator, students are also unable to process story problems into mathematical equations. They are also unable to separate what is known from what is asked, and their solution methods are not appropriate.

Furthermore, observations at Pematangsiantar 2 Public Junior High School (SMP Negeri 2 Pematangsiantar) during the exploratory phase revealed that students considered mathematics difficult to understand, leading many to be passive during the learning process. Furthermore, students lacked a clear understanding of how mathematics is implemented in everyday life. Students also tended to simply write and memorize mathematical formulas without understanding (reasoning) how to solve problems. This resulted in students being less able to process information already in their minds and less able to construct their own knowledge about the social world and their surroundings. (Farida et al., 2019).

Based on the results of an interview conducted by the researcher with one of the teachers named Ginariwaty Situmorang, S.Pd, who stated that the factor causing low student reasoning ability is the learning model used in schools so far is the conventional learning model. In addition, one of the factors causing low student mathematical reasoning ability is the problem often faced by students during the mathematics learning process, namely many students do not understand mathematical concepts so that it is difficult to solve questions that are not the same as the example questions given due to the students' undeveloped mathematical reasoning. During the learning process, the conditions in the

classroom are often not conducive because students tend to get bored easily and their interest in learning mathematics is still very low. (Hotimah, 2020).

To improve students' problem-solving skills, particularly their reasoning skills, students must be encouraged to use an appropriate learning model. Learning models influence students' engagement and acceptance of mathematics. To achieve the learning objectives, teachers must carefully consider how they present and deliver the material. Students must be given the opportunity to construct their own knowledge. One way to achieve this is by providing them with the opportunity to discover and implement their own ideas. Therefore, one of the learning models the researcher will use is the Problem-Based Learning Model.

Muhson (Rahman, 2018) stated that Problem Based Learning (PBL) is a learning method that applies the concepts received in the environment so that learning is not crammed with abstract concepts. This learning method confronts students with real problems, students are presented with problems that can be solved from various perspectives by applying the information they have. Furthermore, Ismaimuza (Rahman, 2018) stated that problems in the teaching and learning process (PBM) are problems that are unstructured or contextual and interesting (contextual and engaging) so that they stimulate students to ask questions from various perspectives.

The main goal of Problem-Based Learning (PBL) is not just to make students simply read and memorize material, but also to reason in solving problems. In other words, this learning model will help students' reasoning abilities, especially in solving mathematical problems. The main goal of Problem-Based Learning (PBL) is to improve students' reasoning abilities. Mathematical reasoning ability is reasoning about and with mathematical objects that is needed to draw conclusions or make a new statement that is true based on several statements whose truth has been previously proven or assumed. Therefore, the Problem-Based Learning (PBL) learning method will greatly assist students in reasoning about mathematical problems so they are able to find solutions and conclusions to statements presented in story form. Math problems in story form support students' understanding because they require comprehensive logical thinking from students. (Guntur et al., 2020).

Several academics have conducted research related to the influence of Problem Based Learning on students' reasoning, including Lutfi

Rhoqifah with the title "The Influence of the Problem Based Learning (PBL) Learning Model on the Mathematical Reasoning Ability of Class XI Students of SMA N 1 Meurebo". In the quasi-experimental study, it was concluded that Problem Based Learning (PBL) has an effect on improving students' reasoning abilities because with this learning model, students are more active in solving problems given by the teacher. In the study, it was found that students' reasoning abilities in the control class had an average of 77.80, while students' mathematical reasoning abilities had an average value of 86.27. The

difference in the average final test results in the two classes was 8.47, with the information that the experimental class got a higher average value compared to the control class, so the author concluded that the use of the Problem Based Learning Model had a significant effect on students' mathematical reasoning abilities. (Malmia et al., 2019) .

Student perception is how students see, understand, and respond to various aspects of the learning environment, such as teachers, learning materials, teaching methods, and the overall school environment. According to articles by experts, such as Sugihartono (2018), perception is defined as the ability of the senses to interpret stimuli. Rakhmat (2018) emphasizes that perception is the giving of meaning to sensory stimuli. Several other experts, including Kotler and Keller (2009), define perception as the process by which individuals create a meaningful picture of the world through selecting, organizing, and interpreting information. This perception will be used to assess the value of the Problem-Based Learning (PBL) model.

Based on the background above, the researcher is interested in discussing "The Effect of Problem Based Learning (PBL) Learning Model on Students' Reasoning Ability in Solving Story Problems on the SPLDV Topic of Class VIII SMP Negeri 2 Pematangsiantar"

RESEARCH METHODS

This research is quantitative. The research method used is an experimental method. The choice of design in experimental research is crucial. The researcher chose a quasi-experimental design. The design used is a pretest-posttest control group design.

This research was conducted at SMP Negeri 2 Pematangsiantar located on Jalan Rajamin, Bukit Sofa, Siantar Sitalasari District, Pematangsiantar City in the 2024/2025 academic year. The reason for conducting this research at the UPTD of SMP Negeri 2 Pematangsiantar was because there had been no previous research conducted at the school using the title The Effect of Problem Based Learning (PBL) Learning Model on Students' Mathematical Reasoning. This research will last for approximately 1 month. The population is a generalization area consisting of: objects/subjects that have certain qualities and characteristics determined by the researcher to be studied and then conclusions drawn (Nurwahid & Shodikin, 2021). The population in this study were grade VIII students of SMP Negeri 2 Pematangsiantar.

A sample is a subset of the population's population and its characteristics (Sugiyono, 2013). Simple random sampling was used to select the sample. This study consisted of students from grades VIII-3 and VIII-8. Class VIII-3 served as the experimental class, with 30 students, and class VIII-8 as the control class.

The independent variable is a variable that influences or causes changes or the emergence of the dependent variable (Erawati, 2022). Therefore, the independent variable in this study is the Problem Based Learning (PBL) learning model. The dependent variable is a variable that is influenced or that becomes the result, because of the existence of the

independent variable (Sugiyono, 2013), the dependent variable in this study is students' reasoning in solving story problems.

According to (Nugroho, 2021) Data analysis is an activity that occurs after data from all respondents or other data sources has been collected. Activities in data analysis include: grouping data based on variables and respondent types, tabulating data based on variables from all respondents, presenting data for each variable studied, performing calculations to answer the problem formulation, and performing calculations to test the proposed hypothesis. (Hutauruk, 2019).

RESULTS AND DISCUSSION

Description and Research Results

Data Description

The study was conducted at the UPTD of SMP N 2 Pematangsiantar, Pematangsiantar City, North Sumatra Province. This study was conducted from September 30, 2025, to October 14, 2025, in the 2025/2026 academic year. The purpose of this study was to observe the effect of the Problem Based Learning Model on students' mathematical reasoning abilities in the SPLDV material using one sample, namely Class VIII-8 consisting of 30 students. (Samadun & Dwikoranto, 2022).

When conducting the research, learning was carried out in 4 meetings, where in the first and second meetings the treatment was carried out, in the third meeting the questionnaire was carried out and in the fourth meeting the students' mathematical reasoning ability test was carried out. Before conducting the research, the researcher first conducted a validation test of the research instrument, this validation was carried out to obtain an instrument that met valid criteria. The instruments tested were a test of students' mathematical reasoning ability and a questionnaire to lecturers and mathematics teachers as validators, namely Mrs. Christa Voni Roulina Sinaga, S.Pd., M.Pd as a Mathematics Lecturer at HKBP Nomensen University Pematangsiantar and Mrs. Ginariwaty Situmorang, S.Pd as a Mathematics teacher at UPTD SMP Negeri 2 Pematangsiantar. The following are the results of the validator of the students' mathematical reasoning ability test and the questionnaire.

Research Description

The purpose of this study was to determine whether there is an influence of the Problem Based Learning Model on Students' Mathematical Reasoning Ability in SPLDV Material for Class VII at UPTD SMP Negeri 2 Pematangsiantar in the 2025/2026 Academic Year. The data in this study are the Students' Mathematical Reasoning Ability test.

The Mathematics material taught in this study is SPLDV, then classes VII-8 were used as samples to be treated using the Problem Based Learning learning model on the SPLDV

material. After being given the treatment and the Problem Based Learning Model, a questionnaire was then given to implement the strategy that would be filled in by students. In this study, researchers obtained data from the results of the Reasoning ability test and the results of the questionnaire conducted in Class VII-8. The Reasoning ability test given was in the form of questions after implementing the Problem Based Learning learning model while the questionnaire was given to see whether the students implemented the Problem Based Learning learning model well. The results of the Reasoning ability test and the results of this questionnaire were used to determine whether the Problem Based Learning learning model had an effect on students' mathematical reasoning abilities on the SPLDV material. The research instrument used in this study was a Reasoning ability test consisting of 5 descriptive questions and a strategy implementation questionnaire for students consisting of 20 statements. (Hadin et al., 2018). Researchers conducted a trial of the Reasoning ability test and the questionnaire for the implementation of the Problem Based Learning learning model which will be used to collect data and samples. After the trial was conducted, the next step was to collect data on students' mathematical Reasoning ability test scores using the questions tested and the questionnaire scores for the implementation of the Problem Based Learning learning model. (Suryadi et al., 2023).

Hypothesis Testing

Simple Linear Regression Test

The strength of the relationship between the independent variable (X) and the dependent variable (Y) and the direction of the relationship between the independent variable (X) and the dependent variable (Y) is measured using a simple linear regression test.

Table 1. Simple Linear Regression Test

SPSS

Coefficients [a]

Model		Unstandardized Coefficients B	Unstandardized Coefficients Std. Error	Standardized Coefficients Beta	t	Sig.
1	(Constant)	40,826	11,888		3,434	,002
	Test	,168	,181	,172	3,926	,362

a. Dependent Variable: Questionnaire

EX CELL

	Coefficients	*Standard Error*	*t Stat*
Intercept	40.82641076	11.88825922	3.434179

X Variable 1	0.168143719	0.181485688	3 ,926485

Based on the table, *the constant* is 40.826 , while the regression coefficient is 0.168 . The simple regression equation can be written as follows:

Y = 40.826 + 0.168 X

Information:

Y = Student problem solving ability test

X = Score for implementing the Problem Based Learning Model

So, it can be translated:

1. The constant 40.826 means that if students do not implement the *Problem Based Learning Model* (Variable X = 0), the Reasoning Ability Test score (Y) will be 40.826 .
2. The regression coefficient value of 0.168 means that for every 1 additional score for implementing the *Problem Based Learning model* , the results of the Reasoning ability test will increase by 0.168.
3. The value of b > 0, then there is a positive influence of variable (X) on variable (Y)

From the explanation above, it can be concluded that the *Problem Based Learning learning model* has a positive influence on students' reasoning abilities.

Regression Significance Test (t-Test)

The regression coefficient was tested using the t-test, this test was carried out to determine the significance of the influence of the independent variable (X) on the dependent variable (Y) assuming that other variables were constant. Based on table 4.15, the significance value for the influence of variable X on variable Y was 0.002 <0.05. Given n = 30, then *df* = n – k = 30 – 2 = 28 with *df* 28, then obtained = 1.701. So that the t_{tabel} *calculated* t value > t *table* is 3.926> 1.701. Based on the significance value and the value t_{hitung}, there is a positive and significant influence on the problem Based learning model *on* students' reasoning abilities.

Coefficient of Determination

The coefficient of determination is a coefficient that states the percentage of influence of variable X on variable Y.

Table 2. Coefficient of Determination

SPSS	**Model Summary** [b]			
	Model R	R Square	Adjusted Square	Standard RError of the Estimate

	, 7 72 [a]	, 674	, 3 05	9,06969

a. Predictors: (Constant), Test

b. Dependent Variable: Questionnaire

Regression Statistics

Multiple R	0, 7 72465542
R Square	0, 673 744363
Adjusted R Square	0, 3 0490762
Standard Error	9.069685603
Observations	30

EXCELL

Based on the table, the correlation value/level of relationship between variables (R) is 0.772, while the coefficient of determination (R square) is 0.674, so the percentage coefficient of determination is written as follows:

KP = 0.67 x 100%

KP = 67.4%

So the coefficient of determination shows that the positive and significant influence of the *Problem Based Learning Model* on students' reasoning abilities is 67.4%.

Discussion

Discussion This research was conducted at the UPTD of SMP Negeri 2 Pematangsiantar involving classes VIII-8 as classes that would be given the Problem Based Learning Model treatment. (Astutik, 2022) .

Pre-testing the test instruments and questionnaires before the research is highly recommended. This aims to determine whether the questions are in accordance with the research guidelines. In this study, students of grade VIII-3 became the trial class for the Student Perception questionnaire and the student reasoning ability test. Then, validity, reliability, difficulty level, and discriminating power of the questions were tested. Based on the trial of the student perception questionnaire and the problem-solving ability test that had been carried out with the number of trial students N = 30 and a significance level of 5% obtained 0.361. The strategy of the results of the validation test calculations on the student perception questionnaire and the reasoning ability test, obtained 20 student perception questionnaires and 5 student reasoning ability test items have values $r_{hitung} > r_{tabel}$so it can be concluded that the 20 student perception questionnaires in the model and 5 student reasoning ability test items are declared valid. (Bintoro et al., 2021). Then, for the decision-making criteria in *the Cronbach's Alpha technique,* if the value is $r_{hitung} > r_{tabel}$, then the

questionnaire instrument and test questions are said to be reliable, so that the questionnaire instrument and test questions can be used in research. (Bachtiar et al., 2018) . From the results of the reliability test that has been conducted, *the Cronbach's Alpha value* for the questionnaire instrument was obtained at 0.875. Because 0.875> 0.355, it can be concluded that this questionnaire instrument is reliable. Meanwhile, the results of the reliability test of the question instrument obtained a *Cronbach's Alpha value* of . Because 0.927> 0.355, it can be concluded that this test question instrument is reliable. Furthermore, in the calculation of the difficulty level test, it shows that questions number 1 to number 5 criteria have an easy level of difficulty. (Razi et al., 2023) . Then, the discriminating power shows that the test items have sufficient discriminating power. (Andari et al., 2024) .

After knowing that the questionnaire items and questions that had been tested had met research standards, the researcher then conducted research in the initial stage by providing treatment to the sample using the Problem Based Learning learning model. (Y. Sari et al., 2020) . After completing the learning using the model, a student perception questionnaire was given to determine how much students responded to the learning model that had been implemented, then the researcher gave test questions with comparative material to determine students' reasoning abilities after being given treatment. (Rivaldi et al., 2018).

After the questionnaire and test scores, the data were analyzed. The results of the calculations showed an average questionnaire score of 51.733 and an average test score of 64.142. There were normality tests and linearity tests as prerequisites for conducting a hypothesis test. The normality test in this study used the *Kolmogorov Smirnov model* using the SPSS 24 program with the criteria of a sig. value > 0.05 of 0.056 > 0.05, so the Problem Based Learning questionnaire data was normally distributed. While the significant results of the test questions were 0.300 > 0.05, so the test question data was normally distributed. (Aini & Mufit, 2022).

After conducting a normality test, the researcher then conducted a linearity test. In this linearity test, SPSS 24 was used, resulting in a significant result: *the Deviation From Linearity row* was 0.830 > 0.05, indicating a linear relationship between the independent variable (X) and the dependent variable (Y). Therefore, it can be concluded that there is a linear relationship between the Problem Based Learning learning model and the dependent variable (Y). on students' reasoning abilities (Insani Nurchintyawati, S.Pd., 2022) .

Furthermore, the researcher conducted a hypothesis test consisting of a simple linear regression test, a regression significance test (t-test), and a coefficient of determination. Based on the simple linear regression test, the regression equation Y = 40.826 + 0.168X was obtained, meaning that for every 1 additional score of the student's Perception questionnaire on the Problem Based Learning learning model, the student's reasoning ability increased by 0.168 and the b value > 0, so there is a positive influence of variable (X) on variable (Y).

Furthermore, with the t-test, the magnitude of the influence of the Problem Based Learning learning model on students' reasoning abilities can be seen from the value t_{hitung}= 3.926 with a significant rate of 0.05. It is known that n = 30 then df = n - k = 30 - 2 = 28. The provision value $t_{tabel}$is 1.701, when compared with t_{hitung}then $t_{hitung} > t_{tabel}$it is 3.926 > 1.701 so it can be concluded that H_o it is rejected and H_a accepted which means "There is a positive and significant influence on the problem based learning learning model on the reasoning abilities of class VIII students at UPTD SMP Negeri 2 Pematangsiantar in the 2025/2026 Academic Year" (Rahman et al., 2024).

The last one is by conducting a determination coefficient test, namely the value of the correlation/level of relationship between variables (R) which is 0.772, while the value of the determination coefficient (R square) is 0.674, so that the contribution of variable X to variable Y in the SPLDV material is 67.4% (Ngandoh & Ali, 2024).

With the conclusion $t_{hitung} > t_{tabel}$that H_o it is rejected and $H_a$accepted, which means that there is a positive and significant influence between the Problem Based Learning Model on the Reasoning Abilities of Class VIII Students at SMP Negeri 2 Pematangsiantar.

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that there is a positive and significant influence between the Problem Based Learning learning model on the reasoning abilities of class VIII students at UPTD SMP Negeri 2 Pematangsiantar in the 2025/2026 academic year. The positive influence is shown through the regression equation Y = 40.826 + 0.168 where the b value = 0.168. The influence is through the t-test, namely t_count>t_table, so H_o is rejected and H_a is accepted, which means there is a positive and significant influence on the Problem Based Learning Learning Model on Students' Reasoning Abilities on SPLDV Material. The magnitude of the influence is shown by the coefficient of determination, which is 67.4%.

Suggestion

1. For Teachers

By understanding the impact of the Problem-Based Learning Model on students' reasoning abilities, teachers are expected to develop learning strategies that best suit the characteristics of their students, thus creating a more active, effective, and efficient learning process. Therefore, the selection of the Problem-Based Learning Model can be an alternative in the classroom learning process.

2. For Students

By understanding how the Problem-Based Learning model influences students' reasoning skills, it is hoped that students will expand their collection of problems, from the simplest to the most varied. Determine effective and efficient learning methods, and

encourage students to actively participate in learning activities to ensure a smooth learning process.

3. For Further Researchers

For future researchers who wish to conduct the same research, it is recommended to develop this research by preparing other material presentations and optimizing time to improve students' reasoning abilities.

REFERENCES

Aini, S., & Mufit, F. (2022). Using Adobe Animate Cc Software In Designing Interactive Multimedia Based On Cognitive Conflict In Straight Motion. *Jurnal Penelitian Pendidikan Ipa*, *8*(5), 2350–2361. Https://Doi.Org/10.29303/Jppipa.V8i5.2048

Andari, R. M., Krisdiana, I., & Hidayati, S. N. (2024). Meningkatkan Kemampuan Pemecahan Masalah Matematika Melalui Penerapan Model Pembelajaran Problem Based Learning Dengan Pendekatan Tarl Pada Materi Persamaan Garis Lurus Di Kelas Viii C Smp Negeri 3 Madiun. *Innovative: Journal Of Social Science Research*, *4*(3), 9924–9938. Https://Doi.Org/Https://Doi.Org/10.31004/Innovative.V4i3.11616

Astutik, S. (2022). Peningkatan Kemampuan Numerasi Melalui Problem Based Learning (Pbl) Pada Siswa Kelas Vi Sdn Oro-Oro Ombo 02 Kota Batu. *Suparyanto Dan Rosad (2015*, *1*(3), 562–582.

Bachtiar, S., Zubaidah, S., Corebima, A. D., & Indriwati, S. E. (2018). The Spiritual And Social Attitudes Of Students Towards Integrated Problem Based Learning Models. *Issues In Educational Research*, *28*(2), 254–270.

Bintoro, H. S., Rochmad, R., & Isnarto, I. (2021). Model Problem Based Learning Dalam Perspektif Ontologi Dan Epistemologi Filsafat Pendidikan Matematika. *Prisma, Prosiding Seminar Nasional Matematika*, *4*, 223–227. Opgehaal Van Https://Journal.Unnes.Ac.Id/Sju/Index.Php/Prisma/Article/View/44972

Devi, P. S., & Bayu, G. W. (2020). Berpikir Kritis Dan Hasil Belajar Ipa Melalui Pembelajaran Problem Based Learning Berbantuan Media Visual. *Mimbar Pgsd Undiksha*, *8*(2), 238–252. Https://Doi.Org/Https://Doi.Org/10.23887/Jjpgsd.V8i2.26525

Erawati, D. (2022). Meningkatkan Motivasi Dan Hasil Belajar Peserta Didik Melalui Penerapan Model Pembelajaran Problem Based Learning Pada Mata Pelajaran Matematika Kelas 1 Sd Negeri 6 Pajar Bulan. *Shes: Conference Series*, *5*(5), 1086–1093.

Farida, N., Hasanudin, H., & Suryadinata, N. (2019). Problem Based Learning (Pbl) – Qr-Code Dalam Peningkatan Hasil Belajar Matematika Peserta Didik. *Aksioma: Jurnal Program Studi Pendidikan Matematika*, *8*(1), 225–236. Https://Doi.Org/10.24127/Ajpm.V8i1.1894

Guntur, M. I. S., Setyaningrum, W., Retnawati, H., & Marsigit. (2020). Can Augmented Reality Improve Problem-Solving And Spatial Skill? *Journal Of Physics: Conference Series*, *1581*(1), 012063. Https://Doi.Org/10.1088/1742-6596/1581/1/012063

Hadin, H., Pauji, H. M., & Aripin, U. (2018). Analisis Kemampuan Koneksi Matematik Siswa Mts Ditinjau Dari Self Regulated Learning. *Jpmi (Jurnal Pembelajaran Matematika Inovatif)*, *1*(4), 657. Https://Doi.Org/10.22460/Jpmi.V1i4.P657-666

Hotimah, H. (2020). Penerapan Metode Pembelajaran Problem Based Learning Dalam Meningkatkan Kemampuan Bercerita Pada Siswa Sekolah Dasar. *Jurnal Edukasi*, *7*(3), 5–11. Https://Doi.Org/10.19184/Jukasi.V7i3.21599

Hutauruk, A. J. B. (2019). Perilaku Resiliensi Matematis Mahasiswa Melalui Model Problem-Based Learning Dengan Pendekatan Metakognitif. *Sepren*, *1*(01), 7–16. Https://Doi.Org/10.36655/Sepren.V1i01.76

Insani Nurchintyawati, S.Pd., M. P. (2022). Android Based Educational Game In Learning And Teaching English Vocabulary. *Journal Of Applied Linguistics*, *2*(1), 13–18. Https://Doi.Org/10.52622/Joal.V2i1.44

Malmia, W., Makatita, S. H., Lisaholit, S., Azwan, A., Magfirah, I., Tinggapi, H., & Umanailo, M. C. B. (2019). Problem-Based Learning As An Effort To Improve Student Learning Outcomes. *International Journal Of Scientific And Technology Research*, *8*(9), 1140–1143.

Ngandoh, S. T., & Ali, A. (2024). Model Problem Based Learning Dengan Pendekatan Tarl Untuk Meningkatkan Hasil Belajar Ipa Peserta Didik Di Smpn 14 Makassar. *Jurnal Pemikiran Dan Pengembangan Pembelajaran*, *6*(2), 1069–1077.

Nugroho, W. (2021). Pendekatan Problem Based Learning Model Diskusi Kelompok Berbantuan Video Youtube Untuk Meningkatkan Aktivitas Dan Hasil Belajar Statistika. *Jurnal Pendidikan Matematika (Kudus)*, *4*(2), 211. Https://Doi.Org/10.21043/Jmtk.V4i2.12259

Nurwahid, M., & Shodikin, A. (2021). Komparasi Model Pembelajaran Problem Based Learning Dan Inquiry Based Learning Ditinjau Dari Kemampuan Pemahaman Konsep Dan Pemecahan Masalah Matematika Siswa Dalam Pembelajaran Segiempat. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(3), 2218–2228. Https://Doi.Org/10.31004/Cendekia.V5i3.346

Puspita, M., Slameto, S., & Setyaningtyas, E. W. (2018). Peningkatkan Hasil Belajar Matematika Siswa Kelas 4 Sd Melalui Model Pembelajaran Problem Based Learning. *Justek : Jurnal Sains Dan Teknologi*, *1*(1), 120. Https://Doi.Org/10.31764/Justek.V1i1.416

Rahman, A. A., Mushlihuddin, R., Refugio, C. N., & Zulnaidi, H. (2024). Problem-Based Learning Innovation Through Realism And Culture: Impact On Mathematical Problem

Solving And Self-Efficacy In Primary School Students. *Al-Jabar: Jurnal Pendidikan Matematika*, *15*(1), 251–264.

Razi, A., Chen, X., Li, H., Wang, H., Russo, B., Chen, Y., & Yu, H. (2023). Deep Learning Serves Traffic Safety Analysis: A Forward-Looking Review. *Iet Intelligent Transport Systems*, *17*(1), 22–71. Https://Doi.Org/10.1049/Itr2.12257

Rivaldi, K. H. O., Putra, D. K. N. S., & Putra, I. K. A. (2018). Pengaruh Model Pembelajaran Problem Based Learning Berbantuan Audio Visual Terhadap Penguasaan Kompetensi Pengetahuan Ipa. *Jurnal Ilmiah Sekolah Dasar*, *2*(2), 128. Https://Doi.Org/10.23887/Jisd.V2i2.15494

Samadun, S., & Dwikoranto, D. (2022). Improvement Of Student's Critical Thinking Ability In Physics Materials Through The Application Of Problem-Based Learning. *Ijorer: International Journal Of Recent Educational Research*, *3*(5), 534–545.

Sari, A. K., & Handini, O. (2023). *Pengaruh Model Pembelajaran Problem Based Learning Berbasis Hots Pada Pembelajaran Ipas Kelas Iv Di Sd Negeri 02 Gawanan Tahun Pelajaran 2022/2023*. *06*(01), 809–823.

Sari, Y., Sutrisno, S., & Sugiyanti, S. (2020). Experimentation Of Problem Based Learning (Pbl) Model On Student Learning Motivation And Achievement On Circle Material. *Formatif: Jurnal Ilmiah Pendidikan Mipa*, *9*(4).

Suryadi, D., Samodra, Y. T. J., Gustian, U., Yosika, G. F., B, P. S., Dewintha, R., & Saputra, E. (2023). Problem-Based Learning Model: Can It Improve Learning Outcomes For Long Serve In Badminton. *Edu Sportivo: Indonesian Journal Of Physical Education*, *4*(1), 29–36. Https://Doi.Org/10.25299/Es:Ijope.2023.Vol4(1).10987

Syamsidah, & Suryani, H. (2018). Buku Model Peoblem Based Learning (Pbl). *Buku*, 1–92.

Wahyuni, R. N., Fauziah, P. Y., Aisyah, S., & Al-Fayed, M. Y. (2023). Implementation Of The Tbm Rumah Asa Program As A Form Of Creative-Innovative Education Based On Entrepreneurship And Local Wisdom In Yogyakarta City. *Qalamuna: Jurnal Pendidikan, Sosial, Dan Agama*, *15*(2), 815–824. Https://Doi.Org/10.37680/Qalamuna.V15i2.3023