



## The Influence of the Problem Based Learning Model on Ability Solution Problem Reviewed of students' Mathematical Self-Efficacy

Ramlan Mahmud<sup>\*1</sup>, Aulidiyah Habbab<sup>2</sup>, Rahmat Kamaruddin<sup>3</sup>

<sup>1</sup> Elementary education, Universitas Negeri Makassar, Indonesia

Email: ramlan.mm@unm.ac.id

<sup>2</sup> Elementary education, Universitas Negeri Makassar, Indonesia

Email: aulidiyahhab@gmail.com

<sup>3</sup> Mathematics, STKIP Andi Matappa, Indonesia

Email: rahmatkamaruddin@gmail.com

### Artikel info

#### Article history:

Received: 12-05-2024

Revised: 16-06-2024

Accepted: 10-09-2024

Publish: 28-09-2024

#### DOI:

[doi.org/10.31960/ijolec.v7i1.2721](https://doi.org/10.31960/ijolec.v7i1.2721)

**Abstract.** This research is an experimental study that uses a Quasi Experimental approach which aims to describe the effect of the Problem Based Learning learning model on problem solving skills in terms of mathematical self-efficacy of MTs Nuhayah Pambusuang. The population in this study were all seventh grades students of 2023/2024 schools year, composed of 4 classes and the research sample were class VIIA with the Problem Based Learning model in pairs and VIID with the Problem Based Learning models in groups. Data collection techniques used pre-tests and post-tests to measure students' problem solving abilities before and after applied the model and questionnaires related to students' self-efficacy. The data analysis techniques used ANAKOVA. The results of the study showed the Problem Based Learning model had an effect on students' mathematical problem-solving skills as seen from the significant differences between pretest and posttest results and the gain in problem solving skills were in the medium category. However, the average gain value of problem-solving abilities of Problem Based Learning model in pairs is higher than the Problem Based Learning models in groups. In addition, Self-Efficacy had no effect on the problem-solving abilities of seventh grades of MTs Nuhayah Pambusuang.

#### Keywords:

*Problem Based Learning ; Problem Solving Skills ; Self-Efficacy*

#### Corresponden author:

**Ramlan Mahmud**

Address: Jalan Tidung 10 No.43, Rappocini, Makassar City

Email: : ramlan.mm@unm.ac.id



Open access article under CC BY-NC-4.0 license

## INTRODUCTION

Education is very important thing as well as No can separated from life, its importance education make reject measuring progress something nation. Mathematics be

one eye very important lesson in the formal education, will but mathematics Still become eye lacking lessons interested by students, so ability solution problem mathematical students in Indonesia still low (Ulandari et al., 2019). Wrong One objective student own

ability Problem solving means being able to solve problems in everyday life and in the world of work, so that students are expected to develop their abilities problem solving and realizing its importance. Problem solving ability is one of the skills that students must master in learning mathematics. This skill helps students think analytically in making daily decisions and improves critical thinking skills when facing new situations ( Maharani et al., 2023) . Solving ability problem mathematical student is ability Which owned student in plan strategy solution problem, carry out strategy Which has chosen, study repeat The problem then creates a systematic and precise solution to the problem the (Siagian et al., 2019).

According to Joseph, the difficulties in solving mathematical problems faced by students are caused by a lack of understanding of the problem, a lack of knowledge about solving strategies, and an inability to transform problems into mathematical form (Riskiyanti et al., 2022) . Apart from that, the relative nature of the characteristics of a problem is also a factor that makes it difficult for students to solve it. Meanwhile, according to Mawardi et al (2022) problems that many students face in various forms of mathematics problems, namely story problems. Solving story problems cannot be done in just one step, but students must solve story problems in several steps which require understanding and skills, both in understanding the questions, carrying out calculations and in drawing conclusions.

Condition also becomes important aspect Where trust himself about mathematics become decider success in solve problem . *Self-Efficacy* that is the beliefs you have student will his influential abilities within solve problem mathematical students , *self-efficacy* mathematical student that is confidence will level and abilities in various activity and context in the Study mathematics (Ulandari et al., 2019) . Mathematical problem solving ability has a positive relationship with student *self-efficacy* and has a function to assess student success in solving problem solving questions (Dinda et al., 2019)

The use of appropriate learning models in mathematics learning is very important in developing students' mathematical problem-solving abilities and *self - efficacy* . Use of the *Problem Based* model *This learning* is a learning

model designed to improve students' mathematical problem-solving abilities and *self-efficacy*. In the *Problem Based learning model Learning*: Students can work in small groups or in pairs and must identify what they know and what they don't know , besides that, students must also learn to solve a problem. According to ( Siagian et al., 2019) *Problem Based Learning* is a learning model that uses a learning approach to authentic and meaningful problems that can develop his knowledge yourself and improve trust ability self-student.

Besides that's a learning model *Problem Based Learning* This can give student For construct his knowledge based on something problem as well as participate active in the learning . So objective study This is For now influence of learning models *Problem Based Learning* on problem solving abilities in terms of mathematics *Self-Efficacy* of MTs students Nuhayah Pambusuang ”

## METHOD

Type study This is study experiments using approach *Quasi Experimental. Quasi Experimental* This is development from *true experimental design* . In research design This has two groups given experiment treatment different. Population in study This that is all over class VII MTs Nuhayah Divided Pambusuang become four class, as for sample study This two classes were selected with use technique *cluster random sampling* , where class first selected that is VIIA class with apply the learning model *Problem Based Learning* in pairs totaling 16 students and divided into 8 groups in a way pair . Class the two selected that is class VIID with apply the learning model *Problem Based Learning* groups of 15 students and are divided into 4 groups, where three group consists of 4 students and one group consists of 3 students. Data collection techniques used that is test ability solution problem and questionnaire *self-efficacy* mathematics student. As for categories ability solution problem can seen in Table 1.

As for normalized gain classification can seen on Table 2.

**Table 1.** Categories of Problem Solving Ability

Problem solving skill	Category
90-100	Very high
80-89	Tall
65-79	Currently
55-64	Low
0-54	Very low

Source : Arikunto ( 2011)

**Table 2.** Classification Level Gains Normalized

Mark Gains Minimized	Category
$0.70 \leq g \leq 100$	Tall
$0.30 \leq g < 0.70$	Currently
$0.00 < g < 0.3$	Low
$g = 0.00$	No increase occurred
$-1.00 \leq g < 0.00$	There was a decline

Source : ( Sukarelawan et al., 2024)

Besides That interpretation self-efficacy scores can seen in Table 3.

**Table 3.** Interpretation of *Self-Efficacy* Scores

Score Interpretation	Category
$x \geq (\mu + \sigma)$	Tall
$(\mu - \sigma) < x < (\mu + \sigma)$	Currently
$x \leq (\mu - \sigma)$	Low

After obtaining data from the problem solving ability test and students' mathematics *self-efficacy questionnaire*, data analysis was carried out. As for technique analysis of the data used use analysis covariance (ANACOVA).

## RESULTS AND DISCUSSION

Results and data analysis in study This obtained based on the data obtained from test ability solution problems and questionnaires *self-efficacy*. Following description results analysis that is Before implementing the *Problem- Based learning model Group learning*, students' problem solving abilities are in the very low category with an average pretest score of 20.75 after implementing *Problem Based-Learning* in

groups. Mathematical problem solving abilities are in the medium category with an average posttest score of 67.42. This shows an increase in students' mathematical problem solving abilities from the very low category to the medium category after implementing the *Problem Based learning model Group learning*. Apart from that, the gain in problem solving abilities is in the medium category with an average value of 0.59. The frequency of problem solving abilities and their gains can be seen in the table 4.

**Table 4.** Frequency of Student Problem Solving Ability

Intervals	Category	Pretetst Frequency	Posttest Frequency
90 – 100	Very high	0	0
80 – 89	Tall	0	1
65– 79	Currently	0	8
55 – 64	Low	0	6
0– 54	Very low	15	0

From Table 4 it can be seen that students' problem solving abilities before implementing the *Problem- Based learning model Group learning* means all students are in the very low category. After implementing *Problem- Based There was an increase in group learning* with 1 student in the high category, 8 students in the medium category, and 6 students in the low category.

**Table 5.** Category and Frequency of Problem Solving Ability Gain

Normalized Gain Value	Category	Frequenc y
$0.70 \leq g \leq 100$	Tall	2
$0.30 \leq g < 0.70$	Currently	13
$0.00 < g < 0.3$	Low	0
$g = 0.00$	No increase occurred	0
$-1.00 \leq g < 0.00$	There was a decline	0

From Table 5 it can be seen that after implementing the *Problem Based-Learning learning model* in groups, there were 2 students in the high category and 13 students in the medium category. There are no students who are in the low category or experiencing

decline. Before implementing the *Problem-Based learning model Learning* in pairs, students' problem solving abilities are in the very low category with an average pretest score of 25.23 after implementing *Problem Based-Learning* in groups. Mathematical problem solving abilities are in the medium category with an average posttest score of 75.47. This shows an increase in students' mathematical problem solving abilities from the very low category to the medium category after implementing the *Problem Based learning model Learning* in pairs. Apart from that, the gain in problem solving abilities is in the medium category with an average value of 0.68. from the research can be seen that students' problem solving abilities before implementing the *Problem- Based learning model Learning* in pairs means that all students are in the very low category. After implementing *Problem- Based There was an increase in pair learning* with 5 students in the high category, 10 students in the medium category, and 1 student in the low category.

**Table 6.** Category and Frequency of Problem Solving Ability Gain

Normalized Gain Value	Category	Frequency
$0.70 \leq g \leq 1.00$	Tall	6
$0.30 \leq g < 0.70$	Currently	10
$0.00 < g < 0.3$	Low	0
$g = 0.00$	No increase occurred	0
$-1.00 \leq g < 0.00$	There was a decline	0

From the research it can be seen that after implementing the *Problem Based-Learning learning model* in pairs, there were 6 students in the high category and 10 students in the medium category. There are no students who are in the low category or experiencing decline. Analysis results descriptive *self-efficacy* student class VIIA and VIID MTs Nuhayah Pambusuang that is seen in Table 7.

**Table 7.** Category and Frequency of *Self-Efficacy* for Class VIIA and VIID Students

Score Interpretation	Category	Frequency
$x \geq 87$	Tall	17
$79 < x < 87$	Currently	12
$x \leq 79$	Low	2

From Table 7 it can be seen that the frequency of *self-efficacy* of students in the high category is 17 students, and in the medium category there are 12 students, while in the low category there are only 2 students. Based on results testing hypothesis with analysis covariance (ANAKOVA) of ability gain data solution problem obtained  $P_{\text{value}} = 0.040$ . This matter show  $P_{\text{value}} < 0.05$  which means that  $H_0$  rejected or in other words, learning model *Problem Based Learning* Good in a way groups and pairs influential to ability solution problem student. Whereas based on results analysis of mathematics *self-efficacy* data student with analysis covariance (ANAKOVA) is obtained  $P_{\text{value}} = 0.707$ . This matter show that  $P_{\text{value}} > 0.05$  which means that  $H_0$  accepted or in other words that *self-efficacy* student No influential to ability solution problem mathematics student .

## Discussion

Ability solution problem student after application of learning models *Problem Based learning* group and *Problem Based learning* pair own difference in average values postsets and the gain value obtained , from difference the so can concluded that ability solution problem mathematics student experience enhancement after implementation of the learning model *Problem Based Learning* Good in a way group nor pair . Besides that , from the difference in the average postset and the gain obtained that learning model *Problem Based Learning* in a way pair more Good compared to learning models *Problem Based Learning* group .

Based on results analysis covariance (ANAKOVA) then learning model is obtained *Problem Based Learning* influential to ability solution problem student . This is also supported by research before , like research that has been carried out by Tahir (2020) who stated that learning model *Problem Based Learning* influential to ability solution problem mathematics student compared with a

learning model direct . Besides that , according to opinion ( Syamsinar et al., 2023) state that application of learning models *Problem Based Learning* influential to ability solution problem mathematics student matter This because *Problem Based Learning* become one of the innovative learning models that can give condition active learning for student as well as capable help student develop ability thinking , solving problems and skills intellectual .

However in study this is a learning model *Problem Based Learning* in a way pair more Good compared with a learning model *Problem Based Learning* in a way group . This matter because when Study in a way pair student more easy interact , discuss and exchange mind with his partner. According to Johnson and Johnson (1989), pair learning can be more effective than learning in large groups because it allows more intensive and in-depth interaction between two students. This can help students understand the material better and develop the skills necessary for independent study and collaboration with others. Meanwhile, according to ( Webb et al., 1995), learning in pairs provides more intensive interaction and direct feedback, can help students achieve deeper understanding and improve learning outcomes compared to studying in larger groups, besides that ( Webb et al., 1995; Ivković, 2023) found that pair learning was effective in a variety of contexts and for a variety of task types, including tasks that required conceptual understanding and problem solving.

Research result about *self-efficacy* mathematics student No influential to ability solution problem mathematics student . Research result This No in line with results research that has been carried out by ( Safithri et al., 2021) who stated that *self- efficacy* own significant influence to ability solution problem mathematics student . Although results study This No in accordance with hypothesis research , however results study This supported by research before , like research that has been carried out by ( Elsiانا et al., 2023) state that No there is influence *self-efficacy* to ability solution problem mathematics student . This matter showed with solution question test that states that although student own *self-efficacy* low but

student the obtain mark test ability solution high problem , as well on the contrary there is students who have *self-efficacy* medium and high but obtain mark test ability solution problem included mathematics low , high and medium . Besides That research conducted (Haqqul & Saraswati, 2023) state that *self-efficacy* no influential to ability solution problem mathematics student . According to Rosida (2016) in (Haqqul & Saraswati, 2023) state that *self-efficacy* influenced by the environment , where If somebody own confidence tall are in the lower class compete so confidence individual the will Keep going reduce so that matter This reflect student in finish task . In finish task student feel not enough exists competition so that they No own challenge and end No try For finish in a way maxilam task the .

In research, ivković et al (2023) stated that the relationship between *self-efficacy* and mathematical problem solving shows that there are other influencing variables, such as previous knowledge and learning strategies which may have a more dominant role in successful problem solving than *self-efficacy* alone. So this implies that although *self-efficacy* is important, it may not be the main or most critical factor in problem solving performance.

## CONCLUSION AND SUGGESTION

Based on results research data analysis so can concluded that learning model *Problem Based Learning* Good in a way groups and pairs influential to ability solution problem students , will but a learning model *Problem Based Learning* in a way pair more Good used compared to learning models *Problem Based Learning* group . Besides That *self-efficacy* No forever can influence ability solution problem student. The suggestion from the research is for practitioners that schools and teachers can more often adopt the paired PBL model in mathematics learning, and teachers need to design learning activities that emphasize the problem-solving process, not just the final result. Further research is needed to examine other factors that can affect the effectiveness of PBL and Although this study shows that *self-efficacy* does not always affect problem-solving ability, it is important to pay attention to this factor. Teachers can help improve students' *self-efficacy* through praise, positive feedback, and opportunities to succeed.

## REFERENCES

- Arikunto, Suharsimi. 2011. *Basics of Educational Evaluation*. Jakarta: Rineka Cipta
- Dinda, A., Larasati, P., Ibnu, S., & Santoso, A. (2019). *Problem Based Learning Model with a Multi-Representation Approach to Improve Students' Problem Solving Ability at Levels*. 828–834.
- Elsiana Tappi' Mangampang, Sundari Hamid, J. (2023). *Embryo education*. 8 (1), 241–257.
- Haqqul, A., & Saraswati, S. (2023). The Influence of Self-Efficacy on Mathematical Problem Solving Ability in Class VIII Statistics Material. *Cartesian: Journal of Mathematics Education*, 2 (2), 241–249. <https://doi.org/10.33752/cartesian.v2i2.2887>.
- Ivković, M., Pellizzoni, S., Doz, E., Cuder, A., Mammarella, I., & Passolunghi, M. C. (2023). Math self-efficacy or anxiety? The role of emotional and motivational contribution in mathematics performance. *Social Psychology of Education*, 26 (3), 579–601. <https://doi.org/10.1007/s11218-023-09760-8>
- Maharani, I., Arief, K., & Oktavia, S. Salmah. (2023). The Influence of the Think Pair Share (TPS) Type Cooperative Learning Model to Improve the Mathematical Problem Solving Ability of Class Xii-Vocational School 2 Al-Washliyah Pasar Senen Medan Students. *Pedagogy: A Scientific Journal of Education*, 9 (1), 23–30. <https://doi.org/10.47662/pedagogi.v9i1.550>
- Mawardi, K., Turmuzi, M., & Azmi, S. (2022). *Analysis of junior high school students' mathematical problem solving abilities in solving story problems in terms of the Polya stages*. 2, 1031–1048.
- Riskyanti, D., Hamid, H., & Jalal, A. (2022). Analysis of the Mathematical Problem Solving Ability of Class VII-1 students at SMP Negeri 14 South Halmahera on Social Arithmetic Material. *Journal of Mathematics Teacher Education*, 1 (1), 41–56. <https://doi.org/10.33387/jpgm.v1i1.2656>
- Safithri, R., Syaiful, S., & Huda, N. (2021). The Effect of Implementing Problem Based Learning (PBL) and Project Based Learning (PjBL) on Problem Solving Ability Based on Student Self-Efficacy. *Scholar's Journal: Journal of Mathematics Education*, 5 (1), 335–346. <https://doi.org/10.31004/cendekia.v5i1.539>
- Siagian, MV, Saragih, S., & Sinaga, B. (2019). Development of Learning Materials Oriented on Problem-Based Learning Model to Improve Students' Mathematical Problem Solving Ability and Metacognition Ability. *International Electronic Journal of Mathematics Education*, 14 (2), 331–340. <https://doi.org/10.29333/iejme/5717>
- Slameto. (2015). *Learning and Factors That Influence It (Revision Print 6)*. Jakarta : PT, Rineka Cipta
- Sukarelawan, MI, Indratno, TK, & Ayu, SM (2024). *N-Gain vs Stacking*.
- Syamsinar, S., K, G., Asmawati, A., & Ahmad, AK (2023). Problem Based Learning (Pbl) Learning Model on Students' Mathematical Problem Solving Ability. *Al-Irsyad Journal of Mathematics Education*, 2 (2), 91–102. <https://doi.org/10.58917/ijme.v2i2.71>
- Tahir, S.R. (2020). *The Effect of Applying the PBL Model on the Mathematical Problem Solving Ability of PGRI (Equated) Sungguminasa Middle School Students*. 2, 56–66.
- Ulandari, L., Amry, Z., & Saragih, S. (2019). Development of Learning Materials Based on Realistic Mathematics Education Approach to Improve Students' Mathematical Problem Solving Ability and Self-Efficacy. *International Electronic Journal of Mathematics Education*, 14 (2), 375–383. <https://doi.org/10.29333/iejme/5721>
- Webb, N. M., Troper, J. D., & Fall, R. (1995). *Constructive Activity and*

Learning in Collaborative Small  
Groups . *Journal of Educational  
Psychology* , 87 (3), 406-423.  
doi:10.1037/0022-0663.87.3.406