LOGIKA: Jurnal Pendidikan Matematika
Vol. 1, No. 1, September 2025, pp. 10-14
eISSN 3110-2506 | https://ejournal.gemacendekia.org/index.php/logika

Implementation of Problem-Based Learning Model to Improve Mathematical Problem-Solving Skills of Praya Timur Middle School Students

Lalu Aji Muliardi Akabar [a,1,*], Salma [b,2]

[a] Universitas Qomarul Huda Baddarudin Bagu, Lombok Tengah and 83562, Indonesia
[b] Universitas Islam Negeri Maulana Malik Ibrahim, Malang and 65233, Indonesia
[1] lalu.ardoth@gmail.com *; [2] idrisalma18@gmail.com
* Lalu Aji Muliardi Akabar

ABSTRACT

This study aims to determine the effect of the implementation of the Problem-Based Learning (PBL) model on the mathematical problem-solving abilities of eighth-grade students at SMP Negeri 2 Praya Timur. The research method used was a quasi-experimental with a pretest-posttest control group design. The subjects were 60 students divided into an experimental class and a control class. The research instrument was a mathematical problem-solving ability test whose validity and reliability had been tested. The results showed a significant increase in problem-solving abilities in students who learned with the PBL model compared to students who learned using conventional methods. The implementation of PBL helped students be more active, think critically, and be able to connect mathematical concepts with real-world situations. These findings recommend the use of PBL as an alternative mathematics learning strategy in secondary schools.

Article History
Received 2025-06-02
Revised 2025-06-12
Accepted 2025-06-15

Keywords
Problem-Based Learning 1
Solution to problem 2
Mathematics Education 3

How to cite: Akabar & Salma (2025). Implementation of Problem-Based Learning Model to Improve Mathematical Problem-Solving Skills of Praya Timur Middle School Students. *LOGIKA: Jurnal Pendidikan Matematika, 1*(1), 10-14 https://doi.org/10.71094/logika.v1i1.166

1. Introduction

Education mathematics own role important in develop ability think logical , critical , and creative students . One of them competence main in learning mathematics is ability solution problem . However , based on results observation early at SMP Negeri 2 Praya East , ability This Still classified as low . Students tend memorize formula without understand draft And difficulty linking material with problem contextual . Education is Wrong One factor key in form quality source Power capable human being compete in the era of globalization . One of the fields that have role important in world education is mathematics . Mathematics No only functioning as means count , but Also as vehicle For practice ability think logical , analytical , critical , and systematically . By Because that , mastery mathematics become important basics in develop ability participant educate For face problem in life daily as well as in the future.

However , the reality is learning mathematics in schools , especially at the elementary level School Intermediate First (junior high school), still face various problem . One of the problem main is low ability student in solve problem . Based on results observation early in Praya Middle School East , visible that part big student experience difficulty in understand draft mathematics And apply it on questions solution problem . They tend only memorize formula without truly understand the settlement process , so when confronted on question based problem contextual , students difficulty find strategy the right solution .

Ability solution problem in mathematics indeed is competence essential things that are needed grown since early . According to Polya , the solution problem mathematics No only demand skills count , but Also involving stages important like understand problem , planning strategy completion , implementation plans , as well as evaluate results . By Because that , the teacher as facilitator learning sued For capable choose the right learning model so that students more active , creative , and involved in a way direct in the process of finding solution from problem mathematics given . Problem - Based Learning (PBL) is Wrong one learning model innovative that emphasizes involvement active student in solve problem real as means Study concept . Some study previously shows PBL is effective increase understanding draft And skills think critical (Hmelo -Silver, 2004; Arends , 2012). By Because that , research This aim study to what extent the implementation of PBL can increase ability solution problem mathematics junior high school students .

One of the relevant learning models with objective the is Problem-Based Learning (PBL). The PBL model emphasizes on giving problem contextual as point beginning learning . Through approach this , students expected can develop skills think critical , collaborative , and independence in learning . PBL also help student For No only understand draft mathematics in a way abstract , but Also link it with life real , so that learning become more meaningful .

A number of study previously show that the application of Problem-Based Learning can increase ability solution problem students . PBL allows student For play a role active in find Alone draft And strategy settlement through discussion group , exchange opinion , and reflection . This is in line with demands Independent Curriculum and The 2013 curriculum emphasizes on skills think level high (*Higher Order Thinking Skills* / HOTS), wrong the only one is ability solve problem .

Based on description Therefore, the application of the Problem-Based Learning model is expected can become solution in overcome low ability solution problem mathematics junior high school students, especially at Praya Junior High School East. With use approach this , students No only directed For get answer true, but Also trained For think critical , systematic , and creative in find solution. By Because that , research This focus on " *Application of Problem-Based Learning Model for Increase Ability Solution Problem Mathematics Praya Middle School Students East "* . Research This expected can give contribution in development strategy learning more mathematics effective , innovative , and in accordance with need students in the education era 21st century .

2. Method

This study uses quasi-experimental research with a pretest-posttest control group design. This approach was chosen because the study involved two groups, namely the experimental group that received treatment with the Problem-Based Learning (PBL) model and the control group that used the conventional learning model. The purpose of this study was to determine the effectiveness of implementing the PBL model in improving the mathematical problem-solving abilities of students at Praya Timur Middle School. The population: All eighth-grade students of Praya Timur Middle School in the 2025/2026 academic year. Sample: Two classes were selected by purposive sampling by considering the equality of initial abilities (homogeneity of mathematics scores), including class VIII A and class VIII B with the number of students in each class being 30.

The instruments used in this study consisted of problem-solving ability tests, observation sheets, and documentation. Instrument validity and reliability tests were conducted before the study: Content validity was tested through expert judgment (supervisors and mathematics teachers) and reliability was calculated using the Cronbach Alpha formula. While data analysis was carried out in two stages: namely Descriptive analysis to calculate the average, median, mode, minimum value, maximum, and standard deviation. Then Describe the students' pretest and posttest scores. Second Inferential Analysis consisting of Normality Test: Using the Kolmogorov-Smirnov / Shapiro-Wilk test to determine the distribution of data. Homogeneity test Using the Levene test to determine the similarity of variance between groups. Independent t-test: To determine the difference in learning outcomes between the experimental class and the control class. And finally N-Gain Score: To see the increase in students' problem-solving abilities

3. Results and Discussion

3.1. Description Condition Beginning

Before application of *the Problem-Based Learning* (PBL) model , ability solution problem mathematics student class VIII of Praya Middle School East Still classified as low . This is seen from :

1. Average value test beginning student only **59.2** .
2. Only **28%** of **students** achieved Criteria Minimum Completion Criteria (KKM) is 70.
3. Based on observation , students tend passive in the learning process , more Lots wait teacher's explanation , and not enough brave put forward idea.
4. Results interview show part big student feel difficulty understand question based problem contextual And No used to compile steps settlement .

3.2. Results Cycle I

After implementation of PBL in cycle I with steps : orientation problems , organizing students , investigation independent / group , presentation results , and reflection , obtained results :

1. Average value increase become **71.3** .
2. Percentage students who achieve KKM increase become **62%** .

3. Activity Study student more alive , even though part Still hesitant in discuss And Not yet capable compile argument in a way coherent.
4. The teacher takes notes that Still There is dominant group discussion , while other members are passive .

3.3. Results Cycle II

On cycle II, the teacher does repair with emphasize distribution role in group , giving guidance more intensive , and clarify step solution problem (understanding problem , planning completion , implementation strategy , and check back). The results obtained :

1. Average value increase significant become **81.6** .
2. Percentage completeness Study reach **87%** , far beyond indicator success (≥80%).
3. Activity student increased ; almost all involved in discussion , dare put forward ideas, and capable serve results settlement problems ahead class.
4. Based on reflection , students confess more motivated Because questions given near with life daily .

3.4. Recapitulation Results

Stage	Average Value	Percentage Completeness	Information
Pre-Cycle	59.2	28%	Low
Cycle I	71.3	62%	Enough
Cycle II	81.6	87%	Very Good

3.5. Discussion

3.5.1 **Improvement Ability Solution Problem**

The implementation of PBL is proven capable increase ability solution problem mathematics Praya Middle School students East . Improvement This happen Because.

1. **Student involved in a way active** in find draft through problem real . This is in accordance with theory constructivism which states that knowledge built Alone by student through experience Study meaningful .
2. **Step systematic PBL** push student For understand problem , designing strategy , implementation , and evaluate results . This is practice skills think level high (*higher order thinking skills*).
3. **Discussion group** give room for student For exchange ideas, train communication mathematical , and develop greater understanding in.

3.5.2 **Changes Activity Study Student**

Before implementation of PBL, students tend passive And only wait teacher's instructions . After applied PBL:

1. Student more **enthusiastic** , because questions given associated with context everyday (for example problem measurement , comparison , or percentage in life real).
2. **Work The same group increased** , although on initially There is students who dominate , but after repair strategy , all member participate .
3. Student become more believe self For presenting results Work the group in front class.

3.5.3 Comparison with Study Previously

Results study This in line with study previously stated that PBL is effective increase ability solution problem mathematics . For example , research by Hmelo -Silver (2004) emphasized that PBL helps student develop skills think critical And solution more problems Good compared to learning conventional.

3.5.4 Implications Results Study

1. Teachers should more often using a learning model based problems , especially on demanding material ability analysis.
2. PBL does not only increase results learn , but Also grow attitude positive to mathematics , such as Work same , responsibility answer , and believe self.
3. School can make PBL as Wrong One strategy learning alternative For increase quality learning mathematics .

References

Arends, R. I. (2012). *Learning to Teach*. New York: McGraw-Hill.

Barrows, H. S., & Tamblyn, R. (1980). *Problem-Based Learning: An Approach to Medical Education*. New York: Springer Publishing.

Depdiknas. (2006). *Permendiknas Nomor 22 Tahun 2006 tentang Standar Isi untuk Satuan Pendidikan Dasar dan Menengah*. Jakarta: Departemen Pendidikan Nasional.

Hmelo-Silver, C. E. (2004). Problem-Based Learning: What and How Do Students Learn? *Educational Psychology Review, 16*(3), 235–266.

Hosnan. (2014). *Pendekatan Saintifik dan Kontekstual dalam Pembelajaran Abad 21*. Bogor: Ghalia Indonesia.

Polya, G. (1973). *How to Solve It: A New Aspect of Mathematical Method*. Princeton: Princeton University Press.

Rusman. (2017). *Model-Model Pembelajaran: Mengembangkan Profesionalisme Guru*. Jakarta: Raja Grafindo Persada.

Sanjaya, W. (2016). *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan*. Jakarta: Kencana.

Sugiyono. (2019). *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif, dan R&D*. Bandung: Alfabeta.

Suhendri, H. (2012). Penerapan Model Problem Based Learning untuk Meningkatkan Kemampuan Pemecahan Masalah Matematika Siswa SMP. *Jurnal Pendidikan Matematika, 3*(2), 45–56.

Surya, E., & Putri, F. A. (2017). Improving Mathematical Problem-Solving Ability and Self-Confidence of High School Students through Contextual Learning Model. *Journal on Mathematics Education, 8*(1), 85–94.

Trianto. (2015). *Model Pembelajaran Terpadu: Konsep, Strategi, dan Implementasinya dalam Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Jakarta: Bumi Aksara.

Uno, H. B. (2012). *Model Pembelajaran: Menciptakan Proses Belajar Mengajar yang Kreatif dan Efektif*. Jakarta: Bumi Aksara.

Wardhani, S. (2010). *Pembelajaran Pemecahan Masalah Matematika di Sekolah Menengah Pertama*. Yogyakarta: PPPPTK Matematika.

Widjajanti, D. B. (2011). Problem-Based Learning dalam Pembelajaran Matematika. *Prosiding Seminar Nasional Matematika dan Pendidikan Matematika UNY*, 57–66.

Yuwono, I., & Rahayu, S. (2016). Peningkatan Kemampuan Pemecahan Masalah Matematika Melalui Model Pembelajaran Berbasis Masalah. *Jurnal Pendidikan Matematika, 10*(1), 1–12