

## **META-ANALYSIS OF THE EFFECTIVENESS OF PROBLEM-BASED LEARNING (PBL) MODELS AT THE MIDDLE SCHOOL LEVEL**

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### **Abstract**

*This research investigates the effectiveness of the Problem-Based Learning (PBL) learning model in improving student learning outcomes at the junior high school level using two cycles of Classroom Action Research (PTK). The PBL learning model can attract students' attention so that they become more active and collaborative. Applying the PBL model can improve problem-solving abilities so that students can think critically. However, there are still challenges in implementing PBL, such as limited resources, the time needed to prepare material, and the teacher's ability to manage dynamic classes. The method used is meta-analysis which is reviewed from a literature review. A literature review is analyzing information from someone's published research. The research began by searching for data in the form of descriptive analysis. The results of the study of the PBL model with two cycles can improve student learning outcomes from the lowest, namely 3.07% to the highest, 42.8%. The results of data analysis in Table 1 mean the first cycle score is 71.78, while the average second cycle score is 85.66. The average score shows a significant change, proving that the use of the Problem-Based Learning model is an effective solution for teachers to improve student learning outcomes at the junior high school level.*

**Keywords:** *Problem-Based Learning (PBL), learning outcomes, classroom action research.*

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Received: 2 August 2023 | Revised: 10 February 2024 | Accepted: 14 March 2024

### **INTRODUCTION**

Education is a bridge for each generation to explore and develop their potential through various channels, one of which is the learning process in schools. In the school learning process, students are not only given knowledge but are also taught to apply important skills and values. The importance of quality education is to produce future generations capable of modifying and creating new innovations. New innovations that utilize advancements such as technology and learning models bring a revolution in the field of education, opening doors for more interactive learning (Fitri, 2021). The quality of education in Indonesia is declining in the learning process. Learning gaps can be seen from the decreasing learning outcomes of students due to the lack of renewal or variation in teaching methods (Rohmawati & Nisa, 2023). The condition of students in learning is less efficient, such as teachers paying less attention to students, so that during the learning process, the criteria for the desired goals are not met. A conducive classroom environment also affects student learning outcomes, such as the relationship between teachers and students collaborating to create an enjoyable classroom atmosphere (Kaban et al., 2020). Therefore, there is a need for the implementation of new and effective learning models to improve the overall quality of education.

A learning model is a tool that creates an environment allowing students to collaborate and interact, leading to change and development. The Problem-Based Learning (PBL) model is an approach that places problems or challenges as the main context in the learning process (Sanjaya, 2021). The PBL model emphasizes active, collaborative, and contextual learning, enabling students to develop problem-solving skills, critical thinking, teamwork, and the ability to relate knowledge to real-world situations (Raharjo & Muljani, 2022). In PBL, students do not merely receive information from the teacher but are also involved in the entire learning process. The implementation of PBL has proven effective in enhancing critical thinking skills and improving student learning outcomes. Through PBL, students are trained to think critically in identifying problems and gathering relevant information (Darwati & Purana, 2021). Furthermore, PBL has also been shown to improve learning outcomes; when students are actively involved in problem-centered learning, they tend to be more motivated to understand the material (Yolantia et al., 2021).

Based on the above discussion, the aim of this study is to investigate the effectiveness of the Problem-Based Learning (PBL) model in improving student learning outcomes at the middle school

level. The data presented aims to demonstrate the effectiveness of the PBL model based on field facts regarding the improvement of learning outcomes.

**METHODS**

This research method utilizes a literature review, referring to relevant articles. The data sources for the literature review were obtained from journals and other references that include information about the Problem-Based Learning (PBL) model using the Classroom Action Research (CAR) design (Santoso et al., 2020). In the search results, twelve articles were found that investigated the topic of the PBL model, student achievement, and middle schools. The article selection process was carried out by considering inclusion criteria such as relevance to the research topic, year of publication, and the reliability of the sources (Hamid Wada et al., 2024). Learning in middle schools is the dependent variable in this study, and the PBL model is the independent variable. Data were taken from the mean scores of cycle 1 and cycle 2. The data obtained were then used to calculate the Effect Size to compare student learning outcomes in cycle 1 and cycle 2 (Meliana Situmorang et al., 2015). The formula to calculate the Effect Size score is:

$$d = \frac{M_{cycle\ II} - M_{cycle\ I}}{\sqrt{\frac{(SD_{cycle\ I} + SD_{cycle\ II})}{2}}}$$

d : Effect Size

M<sub>cycle II</sub> : Mean of cycle II

M<sub>cycle I</sub> : Mean of cycle I

SD<sub>cycle I</sub> : Standard deviation of cycle I

SD<sub>cycle II</sub> : Standard deviation of cycle II

**RESULTS AND DISCUSSION**

The findings of the meta-analysis provide a general explanation of the Problem-Based Learning (PBL) model in the classroom learning cycle. According to Farisi & Hamid (2017), the main goal of implementing the PBL model in middle school education is to enhance students' critical thinking and problem-solving skills. Additionally, research shows that this model successfully increases student engagement in the classroom as it motivates students to actively seek answers to presented problems (Febiani Musyadad et al., 2019). The application of problem-based learning models attracts students' attention, thus improving their learning outcomes and making the teaching and learning process enjoyable and not monotonous (Pratiwi, 2022). The orientation of students towards problems is an important stage to consider in the implementation of problem-based learning models, as it plays a role in determining the success of the model's application (Fauzia, 2018). Providing problems that are relevant to everyday life can motivate students to learn and improve their learning outcomes (Robiyanto, 2021).

**Table 1.** Data Source References Used

Data collection	Data (Years)	Number of Articles
Criteria	2016	1
	2018	1
	2020	1
	2021	1
	2022	6
	2023	2
<b>Learning model</b>	Problem Based Learning (PBL)	12

Based on Table 1, journal references published no more than 10 years ago were used. According to this year's references, it is evident that in 2024, more teachers are implementing the Problem-Based Learning (PBL) model to enhance the effectiveness of student learning outcomes. The average values

for cycle I and cycle II, gain, and N-gain for the sample of 12 articles were then calculated using the distribution of the resulting data. The data were analyzed quantitatively by dividing the scores of cycle I and cycle II. The results of the data analysis are as follows:

**Table 2.** The results of the implementation of PBL

No	Research title	researcher	Learning result improvement			
			Cycle I	Cycle II	Gain	N-Gain %
1	<i>Penerapan Model Problem Based Learning (PBL) untuk Meningkatkan Minat dan Hasil Belajar Siswa di Kelas VII SMP Negeri 1 Montallat Kab Barito Utara Kalimantan Tengah (Balkis &amp; Rahman, 2022).</i>  The Implementation of the Problem-Based Learning (PBL) Model to Increase Interest and Learning Outcomes of Grade VII Students at SMP Negeri 1 Montallat, North Barito Regency, Central Kalimantan	Cahyadi; Syarifah Balkis; Abdul Rahman	78,03	86,42	8,39	10,75
2	<i>Peningkatan Proses Pembelajaran dan Hasil Belajar Siswa Melalui Penerapan Model Pembelajaran Problem Based Learning (PBL) pada Pembelajaran IPS Kelas VIII SMP Negeri 7 Batanghari (Pasaribu, 2021).</i>  Improving the Learning Process and Student Learning Outcomes Through the Implementation of the Problem-Based Learning (PBL) Model in Social Studies for Grade VIII at SMP Negeri 7 Batanghari	Ria Pasaribu	74,38	76,67	2,29	3,07
3	<i>Peningkatan Hasil Belajar Peserta Didik pada Mata Pelajaran PPKn Melalui Model Pembelajaran Problem Based Learning (PBL) di Kelas VII.9 SMP Negeri 10 Palembang (Yanti et al., 2023).</i>	Veren Rudi Yanti, Sri Artati Waluyati, Ardiansyah Saputra	76,9	86,4	9,5	12,35

No	Research title	researcher	Learning result improvement			
			Cycle I	Cycle II	Gain	N-Gain %
	Improving Student Learning Outcomes in Civic Education Through the Problem-Based Learning (PBL) Model in Class VII.9 at SMP Negeri 10 Palembang					
4	<p><i>Penggunaan Model Pembelajaran Problem Based Learning (PBL) dalam Meningkatkan Hasil Belajar Siswa Mata Pelajaran IPS Kelas VIII SMP Negeri 2 Samadua Aceh Selatan (Yudrika &amp; Saffan, 2023).</i></p> <p>The Use of the Problem-Based Learning (PBL) Model to Improve Student Learning Outcomes in Social Studies for Grade VIII at SMP Negeri 2 Samadua, South Aceh</p>	Yudrika, Edi Saffan	68,85	78,46	9,61	13,95
5	<p><i>Upaya Meningkatkan Hasil Belajar Siswa dengan Menerapkan Model Problem Based Learning (PBL) pada Materi Pemanasan Global Kelas VII SMP Swasta DR. Wahidin Sudirohusodo Medan (Hasibuan et al., 2022).</i></p> <p>Efforts to Improve Student Learning Outcomes by Implementing the Problem-Based Learning (PBL) Model on Global Warming Material for Grade VII at SMP Swasta DR. Wahidin Sudirohusodo Medan</p>	Rafiq Nurhidayah Hasibuan, Syarifah Sheila Azmi, Herni Savana	82,9	91,4	8,5	10,25
6	<p><i>Peningkatan Hasil Belajar Peserta Didik Melalui Model Pembelajaran Problem Based Learning (PBL) pada Materi Peluang (Nurkomaria et al., 2022).</i></p>	Vira Nurkomaria, Lusiana, Zainab	64,6	91,6	27	41,79

No	Research title	researcher	Learning result improvement			
			Cycle I	Cycle II	Gain	N-Gain %
7	<p><i>Peningkatan Hasil Belajar IPS Melalui Model Pembelajaran Problem Based Learning (PBL) pada Siswa Kelas VIII-D SMP Negeri 1 Kembayan Kab. Sanggau Kalimantan Barat (Donata, 2022).</i></p> <p>Improving Social Studies Learning Outcomes Through the Problem-Based Learning (PBL) Model for Grade VIII-D Students at SMP Negeri 1 Kembayan, Sanggau Regency, West Kalimantan</p>	Yulia Donata T.R	71,09	81,6	10,51	14,78
8	<p><i>Model Pembelajaran Problem Based Learning dalam Peningkatan Hasil Belajar IPS (Studi Penelitian Tindakan Kelas di SMP Negeri 2 Tolitoli) (Jacub et al., 2020).</i></p> <p>The Problem-Based Learning Model in Improving Social Studies Learning Outcomes (A Classroom Action Research Study at SMP Negeri 2 Tolitoli)</p>	Tasmin A Jacub, Hasia Marto, Arisa Darwis	78,38	85,37	6,99	8,91
9	<p><i>Peningkatan Hasil dan Aktivitas Belajar IPS Model Problem-Based Learning Berbantuan Media SMPN 2 Kawunganten (Suharto &amp; Zamroni, 2016).</i></p> <p>Improving Social Studies Learning Outcomes and Activities with the Problem-Based Learning Model Assisted by Media at SMPN 2 Kawunganten</p>	Suharto, Zamroni	60,00	85,71	25,71	42,85
10	<p><i>Meningkatkan Hasil Belajar IPS Melalui Model Problem Based Learning (PBL) pada</i></p>	Mus S. Radjilun, Thalib Abas,	68,75	87,62	18,87	27,44

No	Research title	researcher	Learning result improvement			
			Cycle I	Cycle II	Gain	N-Gain %
	<i>Siswa SMP Muhammadiyah 1 Ternate (Ahmad, 2018).</i>  Improving Social Studies Learning Outcomes Through the Problem-Based Learning (PBL) Model for Students at SMP Muhammadiyah 1 Ternate	Rasno Ahmad				
11	<i>Penerapan Model Pembelajaran Problem Based Learning untuk Meningkatkan Hasil Belajar Siswa pada Mata Pelajaran Ilmu Pengetahuan Sosial Materi Bentuk-bentuk Mobilitas Sosial Kelas VIII-B SMP Negeri 4 Rokan IV Koto Kab. Rokan Hulu Riau (Tabroni et al., 2022).</i>  The Implementation of the Problem-Based Learning Model to Improve Student Learning Outcomes in Social Studies on the Topic of Forms of Social Mobility for Class VIII-B at SMP Negeri 4 Rokan IV Koto, Rokan Hulu Regency, Riau	Tabroni; Muhammad Syukur; Indrayani	73,00	88,00	15,00	20,54
12	<i>Penerapan Model Pembelajaran Problem Based Learning Dalam Meningkatkan Motivasi dan Hasil Belajar IPA (Gulo, 2022).</i>  The Implementation of the Problem-Based Learning Model to Increase Motivation and Learning Outcomes in Science	Abdiana Gulo	64,52	88,69	24,17	37,46
<b>The Average Learning Outcomes Using Problem-Based Learning</b>			71,78	85,66	13,87	20,34

The Problem-Based Learning (PBL) model has a significant impact on improving student learning outcomes at the middle school level. From the analysis of 12 articles, it is evident that the implementation of the PBL model can significantly improve learning outcomes. Table 2 presents statistics supporting this, showing that the lowest student learning improvement was 3.07%, and the highest was 42.8% after applying the PBL model. Further data analysis shows that the average learning outcome score in cycle 1 was 71.78, which increased to 85.66 in cycle 2 after the implementation of the PBL model.

This change indicates the effectiveness of the PBL approach in enhancing academic achievement among middle school students (Oktaviana & Wardani, 2023). Additionally, the research findings highlight the critical role of teacher characteristics in implementing the PBL learning model. Factors such as the teacher's ability to manage the classroom, the use of appropriate teaching materials, the use of supportive learning media, and the selection of suitable learning models contribute to the effectiveness of learning activities (Mubarok et al., 2023).

Therefore, the results of this meta-analysis demonstrate that problem-based learning approaches like PBL are effective in improving learning outcomes at the middle school level. The implications of this research underscore the importance of training and support for teachers in implementing innovative learning models to enhance the quality of education at the secondary level (Hiasa & Agustina, 2020).

## CONCLUSION

The Problem-Based Learning (PBL) model shows high potential in enhancing students' understanding and skills. The PBL model can improve middle school students' learning outcomes, with the lowest improvement being 3.07% and the highest reaching 42.8%. In cycle I, the average score was 71.78, which increased to 85.66 in cycle II after implementing the PBL model. However, adequate support and training for teachers are necessary to design and manage problem-based learning effectively. Considering these factors, the PBL model has a positive impact on improving student learning outcomes at the middle school level.

## ACKNOWLEDGEMENT

We express our gratitude to all parties who have provided suggestions, comments, and analyses that are highly relevant to the content of this article.

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