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Analysis of the Effectiveness of Problem Based Learning Model in Improving Students' Critical Thinking Skills: A Literature Review

Hamzah Irfanda [1], Zulfani Sesmiarni [1], Nurhasnah [2]
[1] Sjeh Djamil Djambek State Islamic University Bukitinggi, Indonesia
[2] Postgraduate Program, Imam Bonjol State Islamic University Padang, Indonesia
hamzahirfanda1997@gmail.com *

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Abstract

Critical thinking skills are essential competencies that students need to have to face challenges in the era of globalization and digitalization. However, learning processes that are still dominated by traditional approaches often do not support the development of these skills. The Problem-Based Learning (PBL) model comes as an innovative solution that puts students at the center of learning through identifying, analyzing, and solving real problems. This study aims to analyze the effectiveness of PBL model in improving students' critical thinking skills through a literature review of 20 articles from Indonesian and English journals. The results show that the implementation of PBL consistently has a positive impact on the development of students' critical thinking skills at various levels of education. PBL not only improves analytical and problem-solving skills, but also trains students' collaboration, communication and argumentation. Despite some limitations in the methodology of the research reviewed, the evidence supports PBL as an effective pedagogical approach to replace traditional learning. Thus, the implementation of PBL is expected to be a relevant and adaptive learning strategy to face the needs of education in the 21st century.

INTRODUCTION

Critical thinking skills are one of the main abilities that must be mastered by students in facing the complexity of challenges in the era of globalization and digitalization (Bahri, 2022; Saputra, 2024). These skills include the ability to analyze, evaluate, and make decisions based on valid and logical information. However, various studies show that the learning process in many educational institutions is still dominated by traditional approaches that focus on memorization and one-way transfer of information from teachers to students (Harahap et al., 2020; Winarso & Matematika, 2014).

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This approach tends to neglect the development of critical thinking skills that are essential for students' success in solving problems and making decisions in real life. In response to this challenge, innovation is needed in learning methods that are not only oriented towards mastery of the material but also foster higher order thinking skills, such as critical thinking. One approach that has proven effective is Problem Based Learning (PBL) (Pembelajaran et al., 2024; Sulaiman & Azizah, 2020). This model puts students at the center of learning by providing them with opportunities to be actively involved in solving problems relevant to their lives. Through this process, students not only understand the material more deeply, but are also trained to think critically, analyze information, and develop creative and logical solutions.

Problem Based Learning is designed to encourage student involvement in every stage of learning, from problem identification, analysis, to the preparation of solution steps. This problem-based learning process provides meaningful and contextualized learning experiences, so that students are able to connect theoretical knowledge with real situations. In addition, PBL also promotes collaboration skills through group discussions, allowing students to exchange ideas, consider different perspectives and work together in finding the best solution. Thus, PBL not only helps students develop critical thinking skills but also train interpersonal skills that are important in their lives.

METHODS

This research uses the literature review method to analyze the effectiveness of the Problem Based Learning (PBL) learning model in improving students' critical thinking skills. This research method is literature, this method was chosen because it allows researchers to collect and evaluate various previous research results that are relevant to the topic discussed (Penelitian, 2015). The data used comes from journal articles, research reports, books and other academic sources that discuss the implementation of PBL in various educational contexts. This review identifies the main findings of these studies and reviews the factors that influence the success or failure of PBL implementation.

The analysis process in this study was conducted using a synthesis approach, where the researcher combined various findings from previous studies to build a more comprehensive understanding of the impact of PBL on students' critical thinking skills. The researcher also assessed the quality and methodology of the research used as sources, and took into account the different contexts and variables in each study. Thus, the results of this literature review can provide a clearer picture of the effectiveness of PBL, as well as recommendations for the implementation of this learning model at various levels of education.

RESULT AND DISCUSSION

The articles used in this literature review met the inclusion criteria, namely articles in Indonesian and English with free full-text access, titles and content relevant to the research objectives. The results showed that the application of the PBL model in learning can improve students' thinking skills. The results of the review are outlined in a table that contains the code, title, and results of the article review, as well as the article index.

Table 1. Results of Article Review

Code	Article Title	Result	Article Index
A1	The effect of problem-based learning based on cognitive style on critical thinking skills and student retention (S. Arifin, 2020).	Problem Based Learning Model can be applied because this model is able to generate problem solving skills through critical and creative thinking. Compared to Direct Instruction learning model	Scopus Q2
A2	Can Problem-Based Learning Improve Critical Thinking Skills? (Narmaditya et al., 2018).	Students' critical thinking skills have improved. This is indicated by the increased ability to solve problems and make conclusions through the critical thinking process. The application of Problem-Based Learning also encourages students to think critically in the form of asking questions, discussing problems and making solutions related to labor issues, national income and economic growth in Indonesia	Scopus Q3
A3	Effectiveness of problem-based learning on developing critical thinking in nursing students: A systematic review and meta-analysis (Kong et al., 2014).	Our review and meta-analysis showed evidence that the use of PBL can improve nursing students' critical thinking when compared to traditional lectures.	ELSEVIER
A4	The power of problem-based learning in developing critical thinking skills: preparing students for the digital future in today's classrooms (Yih et al., 2014).	Overall, problem-based learning is a powerful pedagogical approach that generates learning that has the potential to address the current failure of higher education institutions, as observed by Paul (1990), to teach students critical thinking skills.	Taylor & Francis
A5	Measuring Critical Thinking in Problem-Based Learning Discourse (Kamin et al., 2001).	This approach can provide useful information on the influence of case modality.	Taylor & Francis
A6	A systematic review of selected evidence on developing nursing students' critical thinking through problem-based learning (Yuan et al., 2008).	The main finding of this systematic review is the lack of high-quality RCTs that determine the effects of PBL on the development of critical thinking.	ELSEVIER

Code	Article Title	Result	Article Index
A7	Systematic review of problem-based learning research in fostering critical thinking skills (Anggraeni et al., 2023).	PBL model can develop critical thinking skills.	ELSEVIER
A8	Methodologies for teaching and learning critical thinking in higher education: A teacher's view (Bezanilla et al., 2019).	Teachers used and considered three methodologies the most effective, viz: oral and written reflection and argumentation; reading, analysis, and synthesis of resources; and case studies, regardless of their concept of critical thinking, although some other trends between methodology and concept of critical thinking were observed.	ELSEVIER
A9	Problem-Based Learning with Argumentation as a Hypothetical Model to Improve Critical Thinking Skills of Junior High School Students (Akhdinirwanto, Agustini, 2020).	PBLA is effective in improving critical thinking skills of junior high school students.	SINTA 1
A10	The Effect of Problem-Based Learning on Students' Critical Thinking Skills and Science Literacy	Problem-based learning model has a significant effect on critical thinking skills and science literacy of grade XI students of MAN 1 Mataram	SINTA 4
A11	Building Critical Thinking Skills of 21st Century Students through Problem-Based Learning Model (Wardani & Fiorintina, 2023).	Indicates that the Problem Based Learning model has a positive impact on fostering critical thinking skills in 21st century students..	SINTA 2
A12	Problem-Based Learning to Improve Critical Thinking Skills (E. G. Arifin & SD, 2020).	Problem-based learning can improve critical thinking skills through 5 phases, (a) orienting the problem; (b) organizing students to research; (c) assisting group investigations; (d) developing and presenting work; (e) analyzing and evaluating the problem solving process.	SINTA 4

Code	Article Title	Result	Article Index
A13	Using Problem-Based Learning Model to Improve Students' Critical Thinking Ability (Ningrum et al., 2021).	Using the Problem Based Learning model can help elementary school teacher education students improve their critical thinking skills.	SINTA 2
A14	Implementation of Problem Base-Learning in Improving Critical Thinking Skills Critical Thinking Skills in Early Childhood (Hatuwe et al., 2023).	A thoughtful and well-structured approach to PBL can effectively promote critical thinking skills in early childhood education	SINTA 5
A15	The Effect of Problem-Based Learning Model on Critical Thinking Skills in Elementary School: A Meta-Analytic Study (Halimatus Sa'diyah et al., 2024).	The problem-based learning model has a significant impact on the formation and development of critical thinking skills of elementary school students in Indonesia.	SINTA 2

The literature review-based research aims to see the effect of using the PBL learning model or prov Dutch learning on students' critical thinking skills in learning which is carried out by reviewing 20 research articles from journals in Indonesian and journals in English, both indexed by Scopus, elseiver, Taylor and Francis, and Sinta 1 to 5. The results obtained show that the application of the PBL model can improve students' critical thinking skills in learning points in addition to critical thinking skills, the application of the PBL model can have a significant effect on students' argumentation skills due to collaboration skills and academic achievement and learning outcomes of students. The use of PBL models in the learning process, students will get their own challenges because they are expected to solve problems that arise in everyday life. When problems are presented, learners are directed to offer solutions to solve them. As a result, during the problem-solving process, these learners have to talk and communicate with other group members to make arguments about the relevance of the problem to everyday life (Apriyani & Alberida, 2023).

The Problem-Based Learning (PBL) model is consistently identified as an effective approach to developing critical thinking skills at various levels of education. Several studies, such as by (S. Arifin, 2020) and (Narmaditya et al., 2018), shows that PBL helps improve students' ability to solve problems and think critically and creatively compared to traditional learning models such as Direct Instruction. This model integrates discussion, analysis and problem solving as key components, which encourages students to think more deeply and structurally.

The effectiveness of PBL is also reinforced through systematic reviews and meta-analyses. For example, research by (Kong et al., 2014) concluded that PBL has a significant positive impact on nursing students' critical thinking. The same thing was emphasized by (Anggraeni et al., 2023), which identified PBL as a consistent method in fostering critical thinking skills through exploration, presentation, and evaluation. However, findings by

(Yuan et al., 2008) noted limitations in research design, such as the lack of high-quality randomized controlled trials (RCTs), which underscores the need for further research to strengthen evidence of PBL's impact. Not only for higher education, the effectiveness of PBL extends to primary education. Study by (Akhdinirwanto, Agustini, 2020) and (Halimatus Sa'diyah et al., 2024) showed that PBL significantly contributes to the development of critical thinking skills of elementary school students. In addition, recent research by (Hatuwe et al., 2023) indicates that PBL can be applied to early childhood education with a structured approach to promote critical thinking early on.

Overall, the Problem-Based Learning model has proven to be effective in developing critical thinking skills at various levels of education. Research shows that PBL not only improves analytical and problem-solving skills, but also helps students prepare for the challenges of the digital age. Despite limitations in the design of some studies, the evidence supports that implementing PBL as a pedagogical approach can overcome the shortcomings of traditional learning in fostering critical thinking skills.

CONCLUSION

Problem-based learning model Problem-Based Learning (PBL) has been proven to be an effective approach in improving students' critical thinking skills. in improving students' critical thinking skills at various levels of education levels. Research shows that PBL encourages students to be active in the learning process through problem identification, analysis, and development. learning process through problem identification, analysis, and development of creative solutions. creative solutions. This approach also strengthens students' ability to collaborate, communicate, and argue, which are important provisions to face the challenges of globalization and digitalization. challenges in the era of globalization and digitalization. The results of the literature review confirms that the application of PBL not only improves critical thinking skills but also has a positive impact on academic achievement. critical thinking skills but also has a positive impact on academic achievement, the ability to argue, and the development of argumentation, and the development of students' interpersonal skills.

However, the success of PBL is highly dependent on the quality of implementation, including teacher competence in facilitating learning and the design of relevant problems. In addition, some studies indicate the need for methodological strengthening in PBL-related studies, such as more structured research designs and randomized controlled trials (RCTs). Overall, these findings underscore the importance of adopting PBL as an innovative learning alternative to replace traditional approaches that tend to be less effective in fostering critical thinking skills. With proper implementation, PBL can be a relevant and adaptive learning strategy for educational needs in the 21st century.

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