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Project-Based Learning (PBL) Model in Improving Critical Thinking of Elementary School Students in Indonesian Language Learning

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Abstract: Critical thinking skills are one of the skills needed in the 21st century, so learning is required to support the improvement of these skills. The problem-based learning model is one alternative that can be used. This article aims to analyze the results of research related to the PBL Model in improving critical thinking skills of Elementary School students in Indonesian Language Subjects. This study uses the Literature Review and Bibliography Review method. The results of the analysis of this article explain the aspects of critical thinking skills that can be improved through the application of the PBL model in Indonesian language learning, the process of implementing the PBL model in Indonesian language learning, the challenges faced by teachers in implementing the PBL model in Indonesian language learning, improving students' critical thinking skills in Indonesian language learning using the PBL model, and research trends on the PBL model related to the title. Based on this study, the problem-based learning model can be an alternative learning model that can improve critical thinking skills in Indonesian Language learning in elementary schools.

Keywords: Critical thinking, Indonesian Language learning, Problem-based learning

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INTRODUCTION

Education today cannot be separated from the emphasis on the need for learning with 21st-century skills that students need to achieve. These skills are often referred to as the 4Cs, namely critical thinking, creativity, collaboration, and communication. Emphasizing the importance of critical thinking skills for elementary school students involves facing and responding to the information explosion in the digital era (Dewi & Jatiningsih, 2015). In addition, this skill also contributes to building the quality of thinking, increasing accuracy, and encouraging rational thinking in students (Syafitri et al., 2021). Critical thinking skills also play a role in developing students' ability to think logically, organize problems, and solve various types of challenges they face (Zakiah & Lestari, 2019). Looking at the urgency of critical thinking skills in learning in elementary schools, teachers certainly need to continue to develop in creating learning that can improve the ability of these skills. In this article, the author wants to show the use of the Problem-Based Learning (PBL) model as an effort to improve the critical thinking skills of elementary school students.

One important aspect of higher-order thinking is critical thinking. Critical thinking is thinking well that is useful for solving problems, making decisions, analyzing, and conducting scientific research (Maylia et al., 2024). Critical thinking can be defined as the ability to draw accurate conclusions about a problem, reflect on the problem, and explore in depth the various options available (Shanta & Wells, 2022). Therefore, the development of critical thinking skills should be one of the main objectives in the learning process (Rivas et al., 2022). At the elementary school level, the application of critical thinking has a positive impact on improving the quality of education and students' readiness to face the rapidly changing world (Anggraeni et al., 2023). However, efforts to develop critical thinking skills among elementary students often experience various obstacles. One of the main problems in learning in elementary schools is the lack of critical thinking skills among students (Lestari et al., 2021). This is often caused by conventional learning methods, which emphasize teaching from the teacher without giving space for students to develop their thinking. Critical thinking skills play a very important role, as they can integrate effective learning strategies to encourage the development of these skills in elementary school students (Hidayati et al., 2022). In the context of education, critical thinking skills are a very important competency for students

to master. Students who have this skill will be better able to understand the concepts and problems faced in learning and can apply this knowledge in various situations (Smith et al., 2022).

Students' critical thinking skills will emerge if trained continuously, one of which is in the learning process (Fahrurrozi et al., 2022). However, the fact is that there are still many teachers who have difficulty in training critical thinking skills, especially among elementary school students. Many teachers have not been able to design innovative and creative learning, so students feel bored during the learning process. This has an impact on students' critical thinking skills. This can be seen when students are given questions related to learning materials, and they have difficulty answering, and tend to be passive (Rahmadana et al., 2023). Therefore, a learning model is needed that can encourage students' active involvement, so that it can help them develop critical thinking skills. One effective model to train students' critical thinking skills is Problem-Based Learning (PBL).

Problem-Based Learning (PBL) is a learning model in which students are faced with a real problem that has been experienced by students (Ardianti et al., 2022). This learning model is centered on students, so that students become more active during learning (Safitri et al., 2024). The PBL model places students in situations that require analysis and problem solving, which encourages them to think critically and creatively, while working in groups to discuss and solve problems, thus improving their collaboration and communication skills. In its implementation, the PBL model refers to the following steps, namely introducing problems to students, facilitating students' learn, assisting students' search activities, describing search results, and analyzing and reviewing the process carried out by students (Evi & Indarini, 2021). Thus, PBL not only helps students understand the subject matter but also helps hone critical thinking skills to face challenges in the real world more skillfully and confidently. The PBL model is very effective in learning and can familiarize students with thinking critically (Rahmadana et al., 2023). This can be seen from the average score, of an increase of 19% in the critical thinking ability of students.

Indonesian language learning that integrates the Problem-Based Learning (PBL) model provides ample opportunities for students to develop language skills as well as critical thinking skills. By applying PBL, students not only learn about grammar rules or

vocabulary, but students are also invited to deal with problems that are the same or similar to challenges that exist in real life, but in a supportive and comfortable learning atmosphere. The PBL model applied to Indonesian language learning can train speaking, listening, reading, and writing skills through collaborative activities, and students can learn to analyze and solve problems, which strengthens their critical thinking skills (Iryanto, 2021).

Although many studies are exploring PBL models in learning contexts, the main focus is often on improving learning outcomes and student engagement in Indonesian subjects. Meanwhile, studies analyzing the impact of PBL on students' critical thinking skills tend to be conducted more in other subjects, such as Mathematics, PPKN, Science, and Social Studies. This suggests that although the PBL model has the potential to improve critical thinking skills, attention to its application in Indonesian language learning is still limited and needs to be improved through further study. For this reason, the writing of this article aims to analyze the results of research related to the Problem-Based Learning model in improving critical thinking skills of elementary school students in Indonesian language subjects. In more detail, the author writes several core points in the article to make it easier for readers to know the essence of this article, namely as follows: aspects of critical thinking skills that can be improved through the application of PBL models in Indonesian language subjects, the process of implementing PBL models in Indonesian language learning in elementary schools, challenges faced by teachers in implementation, how to improve students' critical thinking skills in Indonesian language subjects if using PBL models.

METHODS

The research method used in this research is a systematic literature review. A systematic literature review is a method used to review literature related to questions that must be answered by researchers. This is done realistically by identifying, selecting, and assessing relevant research literature that is the focus of the discussion (Foo et al., 2021). In this study, the Publish or Perish application will be used to collect relevant literature, while the VOSviewer application will be used for bibliometric analysis and mapping of research trends over the past ten years.

After collecting the literature using the Publish or Perish app, the next step is to conduct a screening to ensure the relevance and quality of each source included. Inclusion

and exclusion criteria will be set to select eligible studies, such as year of publication, type of research, and methodology used. Furthermore, bibliometric analysis through VOSviewer will provide insights into collaboration patterns between authors, emerging topic trends, and research developments.

The protocol the authors used was the PRISMA Protocol (Preferred Reporting Items for Systematic Reviews and Meta-Analyses). The primary study selection process is carried out through four stages that refer to PRISMA, namely: identification, screening, eligibility, and inclusion (Liberati et al., 2009; Rahmawati & Juandi, 2022). The reference search was limited to the field of science (Indonesian lessons), open access (all open access), and language (Indonesian), resulting in 100 articles. The articles used focus on articles published in the country of Indonesia, this is because the field of science raised in this article is Indonesian. The data generated is in the form of RIS and CSV formats, which contain citations, bibliographic information, abstracts, and keywords. The RIS file that has been obtained is then imported into Mendeley. Of the 100 articles, after being checked based on the title and abstract, 7 articles were obtained that did contain critical thinking skills of elementary school students in Indonesian language subjects.

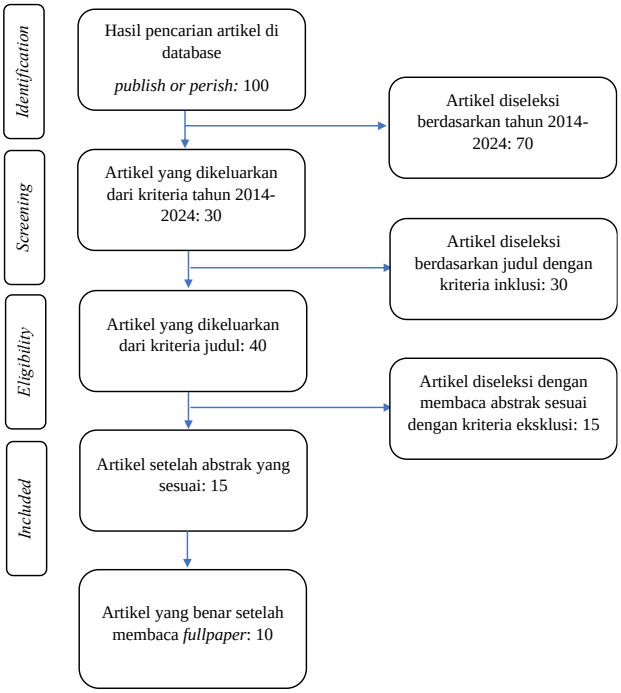

Figure 1. PRISMA Diagram of Problem-Based Learning Model to Improve Critical Thinking Skills of Elementary School Students in Indonesian Subjects

RESULTS

The application of the Problem-Based Learning (PBL) model in Indonesian language learning in elementary schools shows various positive impacts on improving students' critical thinking skills. Several aspects of critical thinking skills can be enhanced through the PBL model, including problem analysis, problem synthesis, decision making, and argument formation (Iryanto, 2021). In the problem analysis process, students are invited to recognize the cause of a problem and analyze relevant information. This activity requires students to develop in-depth reading skills to capture needed information. The research trend of the Problem-Based Learning model related to critical thinking skills of elementary school students in the Indonesian language subject is shown in Figure 2.

Figure 2. Network Visualization

Based on the Network Visualization image shown, it can be seen that research with the keywords “problem-based learning” and “critical thinking” resulted in several interconnected clusters. The main cluster, marked in red, shows the importance of critical thinking in the context of learning, with items such as “primary school,” “interactive learning,” and “evaluation” collaborating in supporting the learning process. On the other hand, the green cluster relating to “Bahasa Indonesia” also shows a connection to critical thinking, where items such as “analysis” and “learning outcomes” illustrate how language can be a tool to develop critical thinking skills. The connections between these clusters highlight the importance of integrating different aspects of education in creating an effective and interactive learning environment.

Furthermore, at the problem synthesis stage, students are challenged to combine various ideas they get from many sources to develop creative and innovative solutions.

This activity also sharpens students' writing and speaking skills because they are required to organize and convey ideas systematically, both in writing and orally. Then, in the decision-making process, students learn to consider various points of view and base their decisions on data and information that has been analyzed, which also trains argumentative speaking skills. Finally, the formation of logical and structured arguments is one of the main skills honed through group discussions in the PBL model, which in turn improves communication skills, including effective listening and expression skills.

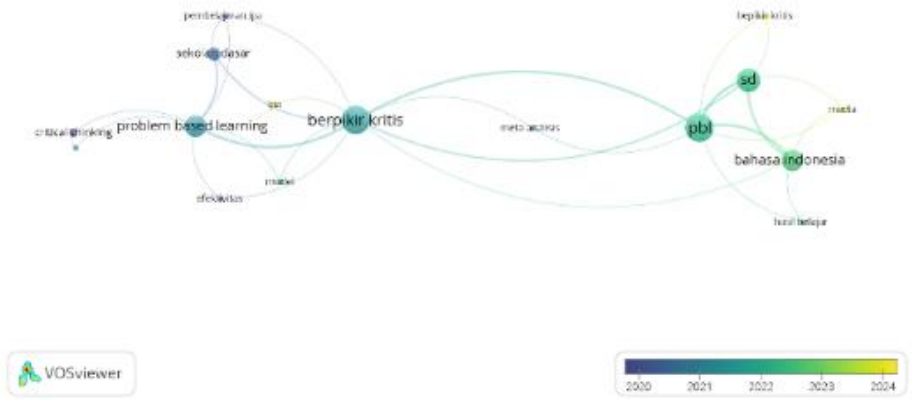

Figure 3. Overlay Visualization

The Overlay Visualization image shows the progression of research by keyword from 2020 to 2024. The colors used reflect the period of research, with the brightest color (yellow) indicating recent research and the darkest color (purple) indicating older research. From this visualization, it can be seen that research conducted in 2020-2021 is dominated by purple and green, indicating high research activity in that period. Recent research shows the relationship between the keywords “critical thinking” and “problem-based learning,” as well as the relationship between “model” and both keywords. In addition, previous research also featured several relevant keywords, such as “high-order thinking skill,” “critical thinking,” “elementary school,” “discovery learning,” “meta-analysis,” “difference,” and “effectiveness.” These linkages indicate the importance of integrating the concepts of critical thinking and problem-based learning in a broader educational context.

The implementation of PBL requires careful planning from the teacher (Wang, 2021). This process starts from understanding the Learning Outcomes (CP), formulating Learning Objectives (TP), preparing the Flow of Learning Objectives (ATP), and

designing relevant teaching modules. In its implementation, learning occurs actively through discussion activities, observation of media such as images or videos, and completion of Learner Worksheets that encourage active student involvement. Assessment in this model is formative and summative, including observation and written tests, which not only assess mastery of the material but also critical thinking skills.

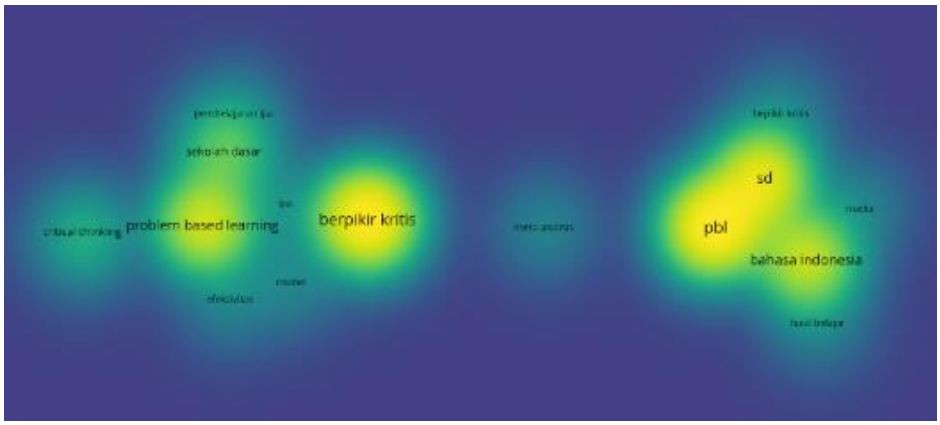

Figure 4. Density Visualization

Figure 4 is a visualization that shows various concepts and approaches to learning, with the main focus on "Problem-Based Learning" (PBL) and "Critical Thinking". These concepts are surrounded by other terms such as "Critical Thinking", "Meta Analysis", "Primary School", and "Science Learning". This visualization uses color density and positional proximity to illustrate the relationships and interrelationships between these concepts. The terms "Problem-Based Learning" and "Critical Thinking" appear brighter and larger, indicating that they have a significant influence in the educational context. The association with other terms, such as "Critical Thinking" and "Meta Analysis", which are also close to the main focus, indicates that these concepts support and reinforce each other.

Overall, this image serves as a conceptual map that illustrates how different thinking skills, learning strategies, and analysis methods interact and build an effective learning environment. This visualization helps in understanding the complexity and interconnectedness of various important elements in the learner-centered learning process and emphasizes the importance of critical thinking skills in education. From the search results, seven articles were found that could be included in the analysis stage. Based on the year of publication of the articles on the Problem-Based Learning (PBL) learning

model in the last few years, the details of the analysis of all the articles can be seen in the following table.

Table 1. Analisis Article Problem-Based Learning

No	Year	Author	Title of Study	Methods	Focus	Country
1	2021	Nindy Dewi Iryanto	Meta Analisis Penerapan Model Pembelajaran Problem Based Learning (PBL) sebagai Sistem Belajar Mengajar Bahasa Indonesia Inovatif di Sekolah Dasar	Qualitative	PBL approach	Indonesia
2	2024	Monica et al.	Analisis Strategi dan Metode Pembelajaran Bahasa Indonesia dengan Hasil Belajar Siswa di Sekolah Dasar Kelas 5	Qualitative	Strategies and methods to improve learning outcomes	Indonesia
3	2024	Zoimatul et al.	Pengaruh Model Problem Based Learning terhadap Keterampilan Berpikir Kritis Siswa Sekolah Dasar	Quantitative	PBL Method	Indonesia
4	2021	Intan et al.	Penerapan Model PBL Untuk Meningkatkan Kemampuan Berpikir Kritis Siswa Pada Kelas IV Sekolah Dasar	Class Action Research	Improve critical thinking skills	Indonesia
5	2024	Haryadi Ilyas et al.	Implementasi Model Problem Based Lerarning Dalam Mata Pelajaran Bahasa Indonesia	Qualitative	PBL Implementation	Indonesia
6	2024	Grace Tampubolon et al.	Penggunaan Problem Based Learning (PBL) Untuk Meningkatkan Kemampuan Berpikir Kritis dan Kemampuan Berbahasa Indonesia	Quantitative	PBL Learning	Indonesia
7	2024	Ridwan Ma'ruf et al.	Pengaruh Model Pembelajaran Problem Based Learning terhadap Hasil Belajar Mata Pelajaran Bahasa Indonesia pada Kelas IV SD Negeri 02 Karangpandan Tahun Ajaran 2023/2024	Quantitative	Influencing learning outcomes	Indonesia
8	2023	Khoirun Nisa et al.	Model Problem Based LearningPada Muatan Pelajaran Bahasa Indonesiadi Sekolah Dasar	Qualitative	Learning Outcomes	Indonesia
9	2023	Muhamad Yasin dan Novaliyosi	Systematic Literature Review: Integrasi Model Problem Based Learning Dengan Media Pembelajaran Dalam Peningkatan Kemampuan Pemecahan Masalah	Systematic Literature Review	Learning Media	Indonesia
10	2020	Bangkit Subarkah	Improved Indonesian Language Learning Outcomes using Problem Based Learning Methods for Class III SD Students	Class Action Research	Learning Outcomes	Indonesia

DISCUSSION

The findings of this study reinforce the view that the Problem-Based Learning (PBL) model has significant potential in enhancing the quality of Indonesian language learning, particularly in developing students' critical thinking skills. In the context of elementary schools, PBL is not merely focused on material mastery but emphasizes the cultivation of higher-order thinking skills, which are crucial for solving real-world problems (Affandy et al., 2024). Through the presentation of authentic and contextual issues, students are encouraged to actively think, discuss, and collaborate in seeking solutions, making learning more meaningful and relevant to their daily lives (Hsbollah & Hassan, 2022).

Nevertheless, the implementation of PBL is not without challenges. Teachers and students often experience discomfort in the initial stages due to their unfamiliarity with the demands of this model, which requires greater autonomy, responsibility, and collaborative effort compared to conventional instructional approaches (Iryanto, 2021; Ristiantita et al., 2024). Time management issues, difficulties in handling group dynamics, and the varied adaptability of students further complicate its application. Effective implementation thus necessitates that teachers possess strong classroom management and discussion facilitation skills to foster a participatory and dynamic learning environment (Moltudal et al., 2022).

Despite these challenges, numerous studies affirm that the advantages of PBL outweigh its difficulties. PBL significantly enhances students' critical thinking, collaboration, and communication competencies (Razak et al., 2022). In the PBL process, students engage in identifying problems, gathering information through reading, comparing ideas through discussion, and articulating solutions both verbally and in writing, thereby experiencing a holistic learning process (Magaji, 2021).

Moreover, PBL fosters independent learning by encouraging students to explore new ideas, thereby increasing motivation and self-confidence (Yu, 2024). This student-centered approach transforms learners into active knowledge constructors rather than passive recipients. Over time, the critical thinking and problem-solving skills developed through PBL serve as vital assets for students in navigating complex challenges beyond the academic setting (Alt & Raichel, 2022).

Assessment in the PBL model is conducted both formatively, through observation during discussions and presentations, and summatively, through written tests at the end of a learning unit (Lenkauskaitė et al., 2021). This dual approach ensures that evaluation captures not only students' cognitive knowledge but also the critical thinking and collaborative skills honed during the learning process. Although obstacles such as limited time and differences of opinion among students are common, effective classroom management and supportive learning environments can mitigate these issues (Dimitriadou & Lanitis, 2023).

Additionally, the collaborative nature of PBL provides valuable opportunities for students to work together, exchange ideas, and offer constructive feedback. These interactions not only deepen their understanding of the subject matter but also enhance their interpersonal communication and teamwork abilities (AlAli, 2024). Analyzing arguments and collaboratively seeking solutions in group discussions inherently cultivates critical thinking, making students more adept at evaluating diverse perspectives and defending their reasoning.

In conclusion, the application of the PBL model in Indonesian language learning has proven effective in creating an enjoyable, meaningful, and cognitively stimulating learning environment. It simultaneously promotes critical thinking, fosters collaboration, encourages independent learning, and enhances students' self-efficacy—capabilities that are increasingly essential in preparing students for real-world problem-solving and lifelong learning.

SIMPULAN

The Problem-Based Learning (PBL) model has been proven to be effective in improving the critical thinking skills of elementary school students, especially in Indonesian language subjects. PBL places students in real situations that require analysis and problem-solving, thus encouraging them to think critically, creatively, as well as collaborate with their peers. The application of this model not only improves students' academic ability but also helps them develop communication and cooperation skills. In addition, several aspects of critical thinking can be improved through the PBL model, namely problem analysis, problem synthesis, decision making, and argument formation. In the implementation of learning, various activities are designed to attract students'

interest, such as checking attendance and question-and-answer sessions. Students are then divided into groups to observe pictures or videos, discuss, and complete the Learner Worksheet. This model aims to increase their active engagement as well as their ability to solve problems encountered daily. Although the implementation of PBL has its challenges, the results show that this method can overcome these obstacles with careful planning and good classroom management. The critical thinking skills developed through PBL can help students face real-world challenges and create a more interactive and meaningful learning environment. To understand the impact of Problem-Based Learning (PBL) in the context of Indonesian language learning, further in-depth studies need to be conducted. This research should include an analysis of the effectiveness of PBL in improving students' language skills, motivation, and participation. In addition, it is important to explore how PBL can be adapted in various learning contexts, both in the classroom and outside the classroom. With a systematic and methodological approach, the results of this study are expected to contribute significantly to the development of more innovative and effective Indonesian language learning strategies.

DAFTAR PUSTAKA

Affandy, H., Sunarno, W., Suryana, R., & Harjana. (2024). Integrating creative pedagogy into problem-based learning: The effects on higher order thinking skills in science education. *Thinking Skills and Creativity*, *53*, 101575. https://doi.org/10.1016/j.tsc.2024.101575

AlAli, R. (2024). Enhancing 21st Century Skills Through Integrated Stem Education Using Project-Oriented Problem-Based Learning. *GeoJournal of Tourism and Geosites*, *53*(2), 421–430. https://doi.org/10.30892/gtg.53205-1217

Alt, D., & Raichel, N. (2022). Problem-based learning, self- and peer assessment in higher education: towards advancing lifelong learning skills. *Research Papers in Education*, *37*(3), 370–394. https://doi.org/10.1080/02671522.2020.1849371

Anggraeni, D. M., Prahani, B. K., Suprapto, N., Shofiyah, N., & Jatmiko, B. (2023). Systematic review of problem based learning research in fostering critical thinking skills. *Thinking Skills and Creativity*, *49*, 101334. https://doi.org/10.1016/j.tsc.2023.101334

Ardianti, R., Sujarwanto, E., & Surahman, E. (2022). Problem-based Learning: Apa dan Bagaimana. *DIFFRACTION*, *3*(1), 27–35. https://doi.org/10.37058/diffraction.v3i1.4416

Dewi, E. K., & Jatiningsih, O. (2015). Pengaruh Penggunaan Model Pembelajaran Problem Based Learning terhadap kemampuan berpikir kritis siswa pada mata pelajaran PPKn kelas X DI SMAN 22 Surabaya. *Jurnal Kajian Moral Dan Kewarganegaraan*, *2*(3), 936–950.

Dimitriadou, E., & Lanitis, A. (2023). A critical evaluation, challenges, and future perspectives of using artificial intelligence and emerging technologies in smart classrooms. *Smart Learning Environments*, *10*(1), 12. https://doi.org/10.1186/s40561-023-00231-3

Evi, T., & Indarini, E. (2021). Meta analisis efektivitas model problem based learning dan problem solving terhadap kemampuan berpikir kritis mata pelajaran matematika siswa sekolah dasar. *Edukatif: Jurnal Ilmu Pendidikan*, *3*(2), 385–395.

Fahrurrozi, F., Sari, Y., & Fadillah, J. (2022). Studi Literatur : Pemanfaatan Model Problem Based Learning terhadap Kemampuan Berpikir Kritis dalam Pembelajaran PKn Siswa Sekolah Dasar. *EDUKATIF : JURNAL ILMU PENDIDIKAN*, *4*(3), 4460–4468. https://doi.org/10.31004/edukatif.v4i3.2795

Foo, Y. Z., O'Dea, R. E., Koricheva, J., Nakagawa, S., & Lagisz, M. (2021). A practical guide to question formation, systematic searching and study screening for literature reviews in ecology and evolution. *Methods in Ecology and Evolution*, *12*(9), 1705–1720. https://doi.org/10.1111/2041-210X.13654

Hidayati, N., Zubaidah, S., & Amnah, S. (2022). The PBL vs. Digital Mind Maps Integrated PBL: Choosing Between the two with a view to Enhance Learners' Critical Thinking. *Participatory Educational Research*, *9*(3), 330–343. https://doi.org/10.17275/per.22.69.9.3

Hsbollah, H. M., & Hassan, H. (2022). CREATING MEANINGFUL LEARNING EXPERIENCES WITH ACTIVE, FUN, AND TECHNOLOGY ELEMENTS IN THE PROBLEM-BASED LEARNING APPROACH AND ITS IMPLICATIONS. *Malaysian Journal of Learning and Instruction*, *19*. https://doi.org/10.32890/mjli2022.19.1.6

Iryanto, N. D. (2021). Meta Analisis Penerapan Model Pembelajaran Problem Based Learning (PBL) sebagai Sistem Belajar Mengajar Bahasa Indonesia Inovatif di Sekolah Dasar. *Jurnal Basicedu*, *5*(5), 3829–3840. https://doi.org/10.31004/basicedu.v5i5.1415

Lenkauskaitė, J., Bubnys, R., Masiliauskienė, E., & Malinauskienė, D. (2021). Participation in the Assessment Processes in Problem-Based Learning: Experiences of the Students of Social Sciences in Lithuania. *Education Sciences*, *11*(11), 678. https://doi.org/10.3390/educsci11110678

Lestari, F. P., Ahmadi, F., & Rochmad, R. (2021). The Implementation of Mathematics Comic through Contextual Teaching and Learning to Improve Critical Thinking Ability and Character. *European Journal of Educational Research*, *volume-10-2021*(volume-10-issue-1-january-2021), 497–508. https://doi.org/10.12973/eu-jer.10.1.497

Liberati, A., Altman, D. G., Tetzlaff, J., Mulrow, C., Gotzsche, P. C., Ioannidis, J. P. A., Clarke, M., Devereaux, P. J., Kleijnen, J., & Moher, D. (2009). The PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate healthcare interventions: explanation and elaboration. *BMJ*, *339*(jul21 1), b2700–b2700. https://doi.org/10.1136/bmj.b2700

Magaji, A. (2021). Promoting Problem-Solving Skills among Secondary Science Students through Problem Based Learning. *International Journal of Instruction*, *14*(4), 549–566. https://doi.org/10.29333/iji.2021.14432a

Maylia, E. C., Amelia, A. P., Suwarna, D. M., Muyassaroh, I., & Jenuri, J. (2024). Strategi Pembelajaran Inkuiri Terhadap Kemampuan Berpikir Kritis Siswa SD. *Jurnal Review Pendidikan Dasar : Jurnal Kajian Pendidikan Dan Hasil Penelitian*, *10*(1), 32–41. https://doi.org/10.26740/jrpd.v10n1.p32-41

Moltudal, S. H., Krumsvik, R. J., & Høydal, K. L. (2022). Adaptive Learning Technology in Primary Education: Implications for Professional Teacher Knowledge and Classroom Management. *Frontiers in Education*, *7*. https://doi.org/10.3389/feduc.2022.830536

Rahmadana, J., Khawani, A., & Roza, M. (2023). Penerapan Model Problem Based Learning untuk Meningkatkan Kemampuan Berpikir Kritis Peserta Didik Sekolah Dasar. *Jurnal Basicedu*, *7*(1), 224–230. https://doi.org/10.31004/basicedu.v7i1.4278

Rahmawati, L., & Juandi, D. (2022). PEMBELAJARAN MATEMATIKA DENGAN PENDEKATAN STEM: SYSTEMATIC LITERATURE REVIEW. *Teorema: Teori Dan Riset Matematika*, *7*(1), 149. https://doi.org/10.25157/teorema.v7i1.6914

Razak, A. A., Ramdan, M. R., Mahjom, N., Zabit, M. N. Md., Muhammad, F., Hussin, M. Y. M., & Abdullah, N. L. (2022). Improving Critical Thinking Skills in Teaching through Problem-Based Learning for Students: A Scoping Review. *International Journal of Learning, Teaching and Educational Research*, *21*(2), 342–362. https://doi.org/10.26803/ijlter.21.2.19

Ristiantita, M., Sari, A. Y., Azahra, N. A., Winarsih, I. O., Alkhoiri, M. F., Mubarak, M. F., & Mayarni, M. (2024). Analisis Strategi dan Metode Pembelajaran Bahasa Indonesia dengan Hasil Belajar Siswa di Sekolah Dasar Kelas 5. *Jurnal Pendidikan Guru Sekolah Dasar*, *1*(3), 11. https://doi.org/10.47134/pgsd.v1i3.290

Rivas, S. F., Saiz, C., & Ossa, C. (2022). Metacognitive Strategies and Development of Critical Thinking in Higher Education. *Frontiers in Psychology*, *13*. https://doi.org/10.3389/fpsyg.2022.913219

Safitri, N., Nuriman, N., Alfarisi, R., & Setya, C. (2024). Model Problem Based Learning Berbantuan Media Flipbook Terhadap Hasil Belajar Matematika Siswa SD. *Jurnal Review Pendidikan Dasar : Jurnal Kajian Pendidikan Dan Hasil Penelitian*, *10*(3), 248–254. https://doi.org/10.26740/jrpd.v10n3.p248-254

Shanta, S., & Wells, J. G. (2022). T/E design based learning: assessing student critical thinking and problem solving abilities. *International Journal of Technology and Design Education*, *32*(1), 267–285. https://doi.org/10.1007/s10798-020-09608-8

Smith, K., Maynard, N., Berry, A., Stephenson, T., Spiteri, T., Corrigan, D., Mansfield, J., Ellerton, P., & Smith, T. (2022). Principles of Problem-Based Learning (PBL) in STEM Education: Using Expert Wisdom and Research to Frame Educational Practice. *Education Sciences*, *12*(10), 728. https://doi.org/10.3390/educsci12100728

Syafitri, E., Armanto, D., & Rahmadani, E. (2021). AKSIOLOGI KEMAMPUAN BERPIKIR KRITIS (Kajian Tentang Manfaat dari Kemampuan Berpikir Kritis). *JOURNAL OF SCIENCE AND SOCIAL RESEARCH*, *4*(3), 320. https://doi.org/10.54314/jssr.v4i3.682

Wang, C.-C. (2021). The process of implementing problem-based learning in a teacher education programme: an exploratory case study. *Cogent Education*, *8*(1). https://doi.org/10.1080/2331186X.2021.1996870

Yu, H. (2024). RETRACTED: Enhancing creative cognition through project-based learning: An in-depth scholarly exploration. *Heliyon*, *10*(6), e27706. https://doi.org/10.1016/j.heliyon.2024.e27706

Zakiah, L., & Lestari, I. (2019). Berpikir kritis dalam konteks pembelajaran. *Bogor: Erzatama Karya Abadi*, *4*.