Cendikia
Jurnal Pendidikan dan Pengajaran
ISSN: 3025-1206

2024, Vol. 2, No.12
383-388

SYSTEMATIC LITERATURE RIVIEW: THE EFFECT OF PBL LEARNING MODEL ON STUDENT'S CRITICAL THINKING ABILITY

Syifa Aulia Putri[1)], Stevanus Budi Waluya[2)]
Universitas Negeri Semarang, Gunung Pati, Semarang, 50229, Indonesia
*Alamat Surel : syifa_ptri05@students.unnes.ac.id

Abstract (English)
Critical thinking is a very important skill for students to address the obstacles faced in this day and age. However, a number of studies show that Indonesian students have low levels of critical thinking, especially in mathematics. The problem-based learning (PBL) model is one method that can be used to overcome this problem. The Systematic Literature Review (SLR) method was used in this study to evaluate the problem-based learning (PBL) approach on improving critical thinking skills. Research published in the time span of 2018 to 2024 with related keywords were investigated. The analysis of 13 articles showed that the use of PBL improved students' critical thinking skills, especially in junior high school. These findings suggest that PBL should be applied as well as possible in the mathematics learning process to develop and improve students' critical thinking skills in Indonesia. Students' inability to explore and develop new ideas is a major obstacle in the application of PBL.

Article History
Submitted: 7 Desember 2024
Accepted: 13 Desember 2024
Published: 14 Desember 2024

Keywords
critical thinking, PBL, SLR.

INTRODUCTION

A major concern in mathematics education is to improve students' ability to think critically. which is an essential skill to face challenges in the modern era. Critical thinking plays an important role in developing students' cognitive abilities as well as helping them retain information acquired during the learning process (Herzon et al., 2018). Individuals who think critically are people who are able to explain the reasons for their decisions, accept differences in opinions and decisions of others and are able to analyze other people's reasons for their different decisions and opinions (Turmuzi et al., 2021). Critical thinking includes identifying conflicting data, data that is appropriate or not, and being able to express conclusions from the data that has been collected (Arjudin et al., 2022).

The results of the Trends in International Mathematics and science and study (TIMSS) in 2011 showed that the ability of students in Indonesia is still at a low international benchmark and has not been able to think logically well (Sunawan et al., 2021). Students who have good logical thinking skills tend to have good critical thinking skills.

Based on the results of the 2018 PISA study released by the OECD, it shows that the ability of Indonesian students in reading literacy obtained an average score of 371, while the average score of the OECD score is 487. For math skills, Indonesian students recorded a score of 379, while the OECD average score was 487. Meanwhile, in science, the average score of Indonesian students reached 389, while the OECD average score was 489. This means that Indonesia is in the low performance quadrant with high quality (Kemdikbud, 2019). Where Indonesia should still have the opportunity to improve critical thinking skills given the capacity and potential that has not been fully developed.

Based on 2 research results from TIMSS and PISA, it shows that Indonesian students are not accustomed to thinking critically in solving a problem. One of the causes is that the learning applied in the classroom is still dominated by the teacher (teacher centered) so that students' critical thinking skills are not well honed (Fithriyah et al., 2016). Problem-based learning model is one of the learning approaches that can develop students' critical thinking skills. (Afifah et al., 2019)PBL is a learning model that is able to train students' skills to gain new knowledge by solving problems, besides that PBL can also encourage students to develop higher-level thinking. (Steven et al., 2019)The emphasis of learning in the PBL model is

Cendikia
Jurnal Pendidikan dan Pengajaran
ISSN: 3025-1206
2024, Vol. 2, No.12
383-388

centered on the specified problem, so that students not only examine concepts related to a problem, but also examine the scientific methods used to solve the problem. Problem-Based Learning is one of the increasingly popular educational approaches (Anwar & Jurotun, 2019).

This learning approach uses contextual problems so that students can learn critical thinking and problem-solving skills, as well as acquire concepts from the material learned (Prihono & Khasanah, 2020). PBL helps understand mathematical concepts through problem solving that is relevant to everyday life. This method allows students to conduct in-depth analysis, explore various problem-solving techniques, and utilize their knowledge more critically (Oktavidiyanti, 2021).

METHODS

Systematic Literature Review

This research applies the Systematic Literature Review (SLR) method to identify, evaluate, and interpret various relevant research results related to research questions, topics, or phenomena that are the focus of attention (Barbara Kitchenham, 2014). SLR was chosen to analyze previous studies on the effect of PBL learning models on students' critical thinking skills

Inclusion Criteria

The inclusion criteria used include: (1) The article contains research that focuses on mathematics, (2) The article examines the effect of PBL on students' critical thinking skills, (3) The literature used has a time span between 2018 and 2024, (4) The article contains the secondary school level of the research sample Articles that were obtained, but outside the inclusion criteria, were not used and not analyzed in this literature study

Data Analysis

After further analysis, articles that met all inclusion criteria were categorized based on two characteristics, namely research publication year and study level. Articles were grouped by publication year to analyze the characteristics of the study level, namely SD/MI, SMP/MTS,SMA/SMK/MA

RESULTS AND DISCUSSION

Findings based on the results of literature searches with the help of Google Sclolar and Publish or Perish and based on inclusion qualifications in the 2018-2024 range with the keywords "the effect of PBL learning on students' mathematical critical thinking skills" obtained as much as 13 literatures from journals. In accordance with the results of the review of 13 literatures, the level of education that is relevant to the effect of PBL learning on students' critical thinking skills used in this research can be seen in Figure 1.

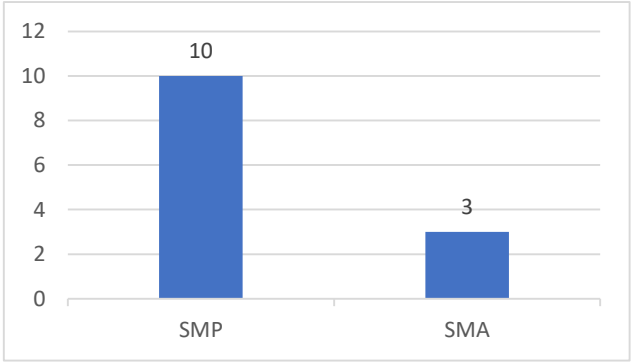

Figure 1. Number of Articles at each leve of education

Cendikia
Jurnal Pendidikan dan Pengajaran
ISSN: 3025-1206
2024, Vol. 2, No.12
383-388

Based on Figure 1, the effect of PBL on students' critical thinking skills is mostly focused on the junior/high school level with a total of 10 studies while the high school level only has 3 studies.

Of the 13 literatures taken with the time span 2018-2024, the most was found, namely 4 literatures in 2021. While the least is in 2018 and 2020, namely only 1 article. Figure 2 below shows the number of literature and years of publication related to the effect of the PBL learning model on students' critical thinking skills.

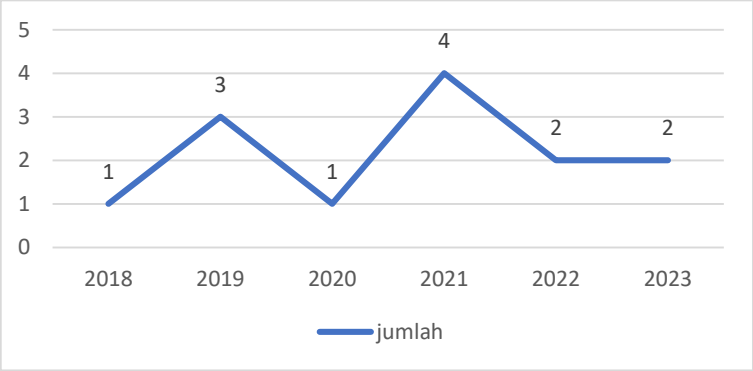

Figure 2. Number of articles and year of publication

Based on the analysis of the 13 literatures, it was found That the findings of the research on the application of PBL learning models were dominated by results Which provided a positive influence on enhancing students' critical thinking skills. Research conducted (Nurfahrani et al., 2023) said there was no significant difference in critical thinking skills between students who followed the PBL model and students who followed the traditional model. This is due to students who are more motivated to the teacher to direct finding answers in detail.

After further analysis, it is known that the obstacles in learning mathematics are when learning takes place still lacking to explore the mathematical critical thinking aspects of students. Where teachers just provide learning without giving students the opportunity to analyze, evaluate, or reflect on the material so that students have difficulty in developing new ideas and ideas(Fannisa Rahmadani & Sudianto Manullang, 2024). Learners often only do problems that are not effective in training their critical thinking skills in learning mathematics. Therefore, in order to create a more meaningful experience, teachers can develop students' critical thinking skills through learning approaches that provide opportunities for participants to build knowledge independently (Susanto, 2013).

Paying attention to the learning model applied is one of the important factors in improving students' critical thinking skills (Amini et al., 2021). In learning mathematics using a problem- based learning approach, students will be divided into several small groups to improve their readiness to understand the material presented. This approach provides space for students to work together in groups, be actively involved in solving the problems given, and encourage independent learning and collaboration in completing tasks. If there are students who have difficulty or do not understand the material, Group members can support each other in providing explanations. Thus creating an active and collaborative learning environment (Halmahera et al., 2019).

The use of a problem-based learning model that is in line with its syntax can have an impact on improving the critical thinking skills of students (Rauf et al., 2022). This is in line with the results of research conducted by (Nurlaeli, n.d.) that there is a significant effect on the level of critical thinking after students are given a problem-based approach (PBL). The

problem-based learning process involves 5 phases, each of which has an important role in its implementation, including (1) phase 1- Orientation learners to the problem, problem orientation allows learners to improve critical thinking skills including interpretation where students can classify or sort issues or events received in a way that makes it clear. (2) phase 2- Organizing learners. (3) phase 3 Facilitating individual and group investigations, the teacher directs learners so that learners can try independently in creating ideas to solve problems. (4) phase 4- Developing and presenting work, this phase shows the ability of students to communicate and make final conclusions based on the problems they have discussed properly through discussion. (5) phase 5- Reviewing and assessing the problem solving process, in this phase learners express ideas and thinking methods that are applied to solve problems (Ullynuha et al., 2015). PBL model starts begins with a real-world problem that requires student cooperation to solve. Thus, This model can enhance the educational experiences of students. Applying the PBL model in the classroom learning process encourages students to think in groups and individually, actively participate in the learning process, and have the ability to solve problems and make the right conclusion/solution (Steven et al., 2019). The advantages of PBL, namely: (1) train students to think critically, find problem solutions, and build understanding based on their experiences; (2) there is an increase in students' active involvement; (3) support students in evaluating their learning progress; (4) increase the number of relevant references; (5) facilitate students in understanding better concepts(Robin Raja Salomon Sipayung & Sahat Saragih, 2023).

Therefore, based on an in-depth review of 13 journals, the result is that the problem-based learning (PBL) model can improve students' critical thinking skills. Teachers encourage students to be actively involved in the learning process. By applying the PBL learning model, students are encouraged to think actively in identifying problems, expressing problem-solving ideas, designing their own investigations to find answers, and drawing conclusions. The problem-based approach also helps students in learning mathematics, especially helping to understand concepts to solve problems.

CONCLUSION

Of the 13 research literature on PBL's impact on students' critical thinking skills in the period 2018-2024, the highest was dominated at the junior high school level and the most publications were in 2021. The results of the research are dominated by the results of the research showing that the problem-based learning / PBL model is proven to improve students' critical thinking skills, compared to other mathematics learning models. However, the application of this PBL model does not always present good results, there is a situation where the application of this problem-based learning model has no impact. In PBL, students are required to be actively involved in the learning process so that they can conclude based on the knowledge they have. This has a beneficial effect, because students are more active and eager to find solutions to problems.

REFERENCES

Afifah, E. P., Wahyudi, W., & Setiawan, Y. (2019). Efektivitas Problem Based Learning dan Problem Solving Terhadap Kemampuan Berpikir Kritis Siswa Kelas V dalam Pembelajaran Matematika. *MUST: Journal of Mathematics Education, Science and Technology*, *4*(1), 95. https://doi.org/10.30651/must.v4i1.2822

Amini, J. N., Irwandi, D., & Bahriah, E. S. (2021). the Effectiveness of Problem Based Learning Model Based on Ethnoscience on Student'S Critical Thinking Skills. *JCER (Journal of Chemistry Education Research)*, *5*(2), 77–87. https://doi.org/10.26740/jcer.v5n2.p77-87

Anwar, K., & Jurotun, J. (2019). Peningkatan Aktivitas dan Hasil Belajar Siswa SMA Pada Dimensi Tiga Melalui Model Pembelajaran PBL Berbantuan Alat Peraga. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *10*(1), 94–104. https://doi.org/10.15294/kreano.v10i1.19366

Arjudin, A., Sripatmi, S., Prayitno, S., Tyaningsih, R. Y., & Salsabila, N. H. (2022). Pendampingan Pengembangan Soal Matematika Berkarakteristik Kemampuan Berpikir Kritis pada Guru-Guru Matematika SMP/MTs di Kecamatan Labuapi Kabupaten Lombok Barat. *Rengganis Jurnal Pengabdian Masyarakat*, *2*(2), 135–146. https://doi.org/10.29303/rengganis.v2i2.229

Barbara Kitchenham. (2014). Procedures for Performing Systematic Reviews. *Keele University Technical Report*, *33*(2004), 1–26. https://www.researchgate.net/publication/228756057

Fannisa Rahmadani, & Sudianto Manullang. (2024). Pengaruh Model Problem Based Learning terhadap Kemampuan Berpikir Kritis Matematis Siswa SMP. *ALFIHRIS : Jurnal Inspirasi Pendidikan*, *2*(4), 46–56. https://doi.org/10.59246/alfihris.v2i4.994

Fithriyah, I., Sa'dijah, C., & Sisworo. (2016). Analisis Kemampuan Berpikir Kritis. *Prosiding Konferensi Nasional Penelitian Matematika Dan Pembelajarannya*, *2006*, 155–158.

Halmahera, N., Pada, S., & Kubus, M. (2019). *PENGARUH MODEL PEMBELAJARAN BERBASIS MASALAH TERHADAP KEMAMPUAN BERPIKIR KRITIS MATEMATIS SISWA SMP NEGERI 62 HALMAHERA SELATAN PADA MATERI KUBUS*. *8*(1), 36–50.

Herzon, H. H., Budjianto, & Utomo, D. H. (2018). Pengaruh Problem-Based Learning (PBL) terhadap Keterampilan Berpikir Kritis. *Jurnal Pendidikan: Teori, Penelitian, Dan Pengembangan*, *3*(1), 42–46. http://journal.um.ac.id/index.php/jptpp/

Kemdikbud. (2019). *Hasil PISA Indonesia 2018: Akses Makin Meluas, Saatnya Tingkatkan Kualitas*. https://www.kemdikbud.go.id/main/blog/2019/12/hasil-pisa-indonesia-2018-akses-makin-meluas-saatnya-tingkatkan-kualitas

Nurfahrani, N., Hayati, L., Lu'luilmaknun, U., & Kurniati, N. (2023). Pengaruh Model PBL terhadap Kemampuan Berpikir Kritis Siswa Kelas VIII SMPN 23 Mataram. *Jurnal Ilmiah Profesi Pendidikan*, *8*(4), 2403–2407. https://doi.org/10.29303/jipp.v8i4.1831

Nurlaeli. (n.d.). *Model, Pengaruh Problem, Pembelajaran Terhadap, Learning Berpikir, Kemampuan Smp, Matematika Siswa*. *2*, 23–30.

Oktavidiyanti, A. R. (2021). Pengaruh Model Problem Based Learning (Pbl) Terhadap Kemampuan Berpikir Kritis Matematis Siswa. *Geomath*, *2*(2), 1. https://doi.org/10.55171/geomath.v2i2.862

Prihono, E. W., & Khasanah, F. (2020). Pengaruh Model Problem Based Learning Terhadap Kemampuan Berpikir Kritis Matematis Siswa Kelas Viii Smp. *EDU-MAT: Jurnal Pendidikan Matematika*, *8*(1), 74–87. https://doi.org/10.20527/edumat.v8i1.7078

Rauf, I., Arifin, I. N., & Arif, R. M. (2022). Pengaruh Model Problem Based Learning Terhadap Kemampuan Berpikir Kritis Siswa. *Pedagogika*, *3*(8), 163–183. https://doi.org/10.37411/pedagogika.v13i2.1354

Robin Raja Salomon Sipayung, & Sahat Saragih. (2023). Pengaruh Pembelajaran Berbasis Masalah Terhadap Kemampuan Berpikir Kritis Matematis Siswa Smp. *Jurnal Riset Rumpun Matematika Dan Ilmu Pengetahuan Alam*, *2*(1), 113–123. https://doi.org/10.55606/jurrimipa.v2i1.742

Steven, D., Ndia, L., & Arapu, L. (2019). *PENGARUH MODEL PROBLEM BASED LEARNING TERHADAP KEMAMPUAN BERPIKIR KRITIS MATEMATIS PESERTA DIDIK KELAS VII SMP NEGERI 2 KENDARI*. *7*(3), 15–28.

Sunawan, A., Suryadi, D., & Rosjanuardi, R. (2021). *BELIEFS DAN PROFIL PEMBELAJARAN GURU MATEMATIKA SAMPEL STUDI TIMSS 2011 KELAS VIII PENDAHULUAN Indonesia telah melakukan berbagai reformasi dalam pola*

penyelenggaraan pendidikan sejak dikeluarkannya Undang-Undang Nomor 20 Tahun 2003 tentang Sistem Pendidi. *6*(September), 117–129.

Susanto, A. (2013). *Teori Belajar dan pembelajaran*. Prenadamedia Group.

Turmuzi, M., Sarjana, K., & Junaidi, J. (2021). Meningkatkan Kemampuan Berpikir Kritis Pada Perkuliahan Geometri Bilangan Kompleks Dengan Discovery Learning Dipadukan Dengan Cooperative Learning Tipe NHT (Numbered Head Together). *Mandalika Mathematics and Educations Journal*, *3*(2), 149–160. https://doi.org/10.29303/jm.v3i2.1521

Ullynuha, L., Prayitno, A., & Ariyanto, J. (2015). Pengaruh Pembelajaran Problem Based Learning (Pbl) Terhadap Kemampuan Berpikir Kritis Siswa Kelas X Sma Negeri 6 Surakarta Tahun Pelajaran 2012/2013 the Effect of Studying Problem Based Learning (Pbl) To the X Grade of Sma Negeri 6 Surakarta Students Crit. *Core.Ac.Uk*, *7*, 40–51. https://core.ac.uk/download/pdf/289788221.pdf