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INNOVATIVE LEARNING MODELS FOR ELEVATING STUDENTS' MATHEMATICAL LITERACY: A SYSTEMATIC REVIEW

Amelia Defrianti Putri[1], Dadang Juandi[1*], Turmudi[1], Dilham Fardian[1], Yerizon[2]

[1]Department of Mathematics Education, Universitas Pendidikan Indonesia, Jawa Barat, Indonesia
[2]Department of Mathematics Education, Universitas Negeri Padang, Sumatera Barat, Indonesia
* Correspondence: dadang.juandi@upi.edu

Abstract

In Indonesia, students' mathematical literacy is still low and requires continuous improvement. One of the efforts made is the use of learning models that can enhance mathematical literacy skills. This study aims to provide a comprehensive review of learning models to improve mathematical literacy, with a focus on identifying areas that require further research. This study is a systematic literature review that includes scholarly articles published between 2018 and 2023, using the keywords "mathematical literacy" and "learning models," resulting in 16 articles that meet the inclusion criteria. The findings identify several effective learning models, including Problem-Based Learning, Realistic Mathematics Education, Blended Learning, Cooperative Team Games Tournament, Reading to Learn, Missouri Mathematics Project, Means Ends Analysis, Learning Cycle, Survey Question Read Reflect Recite Review, Project-Based Learning, and Collaborative Learning. The implications of this research emphasize the importance of adopting appropriate learning models to improve students' mathematical literacy. This study has limitations in its scope, particularly regarding the diversity of educational contexts and student demographics. Future research should address these gaps by investigating the effectiveness of the identified learning models across various educational settings and among diverse student populations. Furthermore, exploring the role of technology integration and the impact of teacher professional development on the implementation of these models would provide valuable insights for improving mathematical literacy.

Keywords: Mathematical Literacy; Learning Model; Systematic Literature Review

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Introduction

In the era of globalization, international competency assessments such as the Programme for International Student Assessment (PISA) provide valuable insights into students' abilities worldwide (İDİL et al., 2024). PISA assesses 15-year-old students in mathematical literacy, scientific literacy, and reading literacy every three years to evaluate the quality of education in participating countries. The results of this assessment are used to measure cognitive skills, focusing on students' ability to process information and apply knowledge in real-world contexts (Putri et al., 2025; Wijaya et al., 2024).

Despite the importance of these competencies, international assessments such as PISA continue to reveal significant disparities in students' math achievement. For example, the 2022 PISA results showed a 15-point decline in average mathematics performance among OECD countries compared to 2018, raising concerns about the state of math education worldwide (OECD, 2023). Various studies suggest that this decline has been caused by several factors, including disruptions caused by the COVID-19 pandemic, insufficient teacher training in modern pedagogical methods, and unequal access to learning resources, particularly in underdeveloped areas (Hikmah et al., 2024; Putri et al., 2025). In Indonesia, PISA results also show that students' performance in mathematics remains low, reflected in rankings consistently below the global average (Fardian et al., 2025). This ranking highlights the urgent need to improve mathematical literacy among Indonesian students. Mathematical literacy, defined as the ability to apply mathematical knowledge to solve real-world problems, is a core focus within the PISA framework (Hwang & Ham, 2021).

However, many Indonesian students with average or below-average math skills struggle to meet the criteria for mathematical literacy (Tasman et al., 2022). Therefore, to improve students' mathematical literacy, the implementation of appropriate and effective learning models is required. A learning model is a systematic approach designed to achieve specific learning goals. This model includes planning, organizing, and implementing the learning process to optimize student learning (Nurlaela & Imami, 2022). An effective learning model must integrate real-life problem-solving and explore contexts relevant to students' lives, thereby encouraging student engagement in meaningful learning (Istiana et al., 2020; Fardian et al.,2025). Teachers play a central role in enhancing students' mathematical literacy, and innovative teaching approaches based on local context are needed to meet students' needs (Aini, 2021; Arifin, 2022).

Several previous literature reviews have addressed effective learning models. For example, Valverde-Berrocoso et al. (2020) examined the evolution of e-learning research, highlighting key themes such as MOOCs and interactive learning environments. Artiluhung et al. (2024) investigated innovative teaching strategies in physical education for elementary schools, demonstrating their effectiveness in fostering inclusive learning environments. Similarly, Davies et al. (2013) reviewed creative learning environments and identified factors like resource availability and the physical environment that promote creativity. Santos et al. (2018) focused on strategic guidelines for student-centered teaching approaches, emphasizing the importance of diverse learning environments and teacher-student relationships. However, none of these reviews have specifically mapped learning models based on educational levels,

effectiveness, or contextual relevance to Indonesia, particularly in the context of mathematical literacy. This gap highlights the need for further research to explore and evaluate learning models tailored to Indonesia's unique educational landscape

The implementation of effective learning models is also crucial in improving students' mathematical literacy. In this regard, the use of learning models that incorporate local cultural contexts and real-life situations will help students more easily understand and apply mathematical concepts in their daily lives (Putri et al., 2024). Therefore, this study aims to provide a comprehensive review of learning models that can enhance students' mathematical literacy. The main focus of this research is to identify effective learning models for solving real-world problems and optimizing student engagement in the learning process (Setyowati & Nurcahyo, 2023; Surat, 2019). By mapping out these learning models, this study presents a detailed analysis of the strengths and weaknesses of various learning models, thereby facilitating policymakers and curriculum developers in determining the most suitable models based on students' characteristics, such as age, developmental stage, and specific mathematical competencies. This approach will enable the implementation of more targeted and effective teaching strategies that are aligned with students' unique learning needs and abilities.

Methods

The research methodology employed in this study was a Systematic Literature Review (SLR). SLR is a method used to systematically identify, curate, and critically evaluate relevant scholarly research, while also gathering and analyzing data from these studies to create a well-structured and clearly defined scientific work. The research process involved several key components, including data collection, data analysis, and the formulation of conclusions (Putri et al., 2024b).

Research strategy

Following the research goals, this study defined the subsequent inclusion criteria for data collection, as seen in Table 1:

Table 1. Inclusion and exclusion criteria

No	Inclusion Criteria	Exclusion Criteria
1	Publications must come from research in the field of mathematics education.	The article does not contain a learning model
2	The research must be conducted in Indonesia	The research was conducted in other countries
3	The primary study was published in the period 2018 – 2023 in national journal indexed by SINTA	Articles not indexed by SINTA
4	Articles must contain the keywords learning model" and "mathematical literacy"	

Each article underwent thorough scrutiny to identify relevant themes and sub-themes. Subsequently, a comprehensive examination of each article was conducted to gather any supplementary information that aligned with the research objectives. During the systematic review study selection process, primary studies that did not meet the inclusion criteria were

excluded from consideration.

Research instrument

The research instruments consisted of checklists used during the article screening process. These checklists were aligned with the inclusion and exclusion criteria based on journal indices, learning models, year of publication, and educational level. The data collected primarily included original research published in national journal articles. This information was sourced from electronic databases recognized and indexed by SINTA. To ensure the quality and replicability of the review process, PRISMA has established a standardized methodology, which has undergone peer review and includes a set of optimal guidelines. The primary study selection process followed four stages based on the PRISMA guidelines: identification, screening, eligibility, and inclusion.

To ensure the reliability and objectivity of the data selection process, a systematic approach was employed involving multiple reviewers. Initially, two independent reviewers conducted the screening and selection of relevant studies based on pre-defined inclusion and exclusion criteria. This dual-reviewer process was implemented to minimize bias and ensure a thorough selection of high-quality articles. In instances of disagreements between the reviewers, the differences were discussed and resolved through consensus. If a consensus could not be reached, a third reviewer was consulted to make a final decision, thereby ensuring the objectivity and consistency of the selection process. By employing this multi-reviewer approach, the reliability and validity of the data selection process were maintained, guaranteeing the quality of the studies included in the review

The systematic literature review outlines the process of study selection in Figure 1. The exploratory inquiry yielded a total of 186 abstracts, which were retrieved from databases such as Semantic Scholar, Google Scholar, and the Education Resources Information Center (ERIC). However, after applying the established inclusion criteria, only 16 articles were deemed eligible and officially listed in SINTA. These 16 articles met all the necessary criteria, including relevance to the research topic, methodological rigor, and academic quality. The process of narrowing down these articles involved a detailed screening procedure to ensure that only the most pertinent studies were included in the review. A graphical representation illustrating the results of the search process, including the steps involved in selecting the primary studies, is presented in Figure 1. This figure highlights the stages of study selection, from the initial pool of 186 abstracts to the final 16 articles that were included in the systematic review.

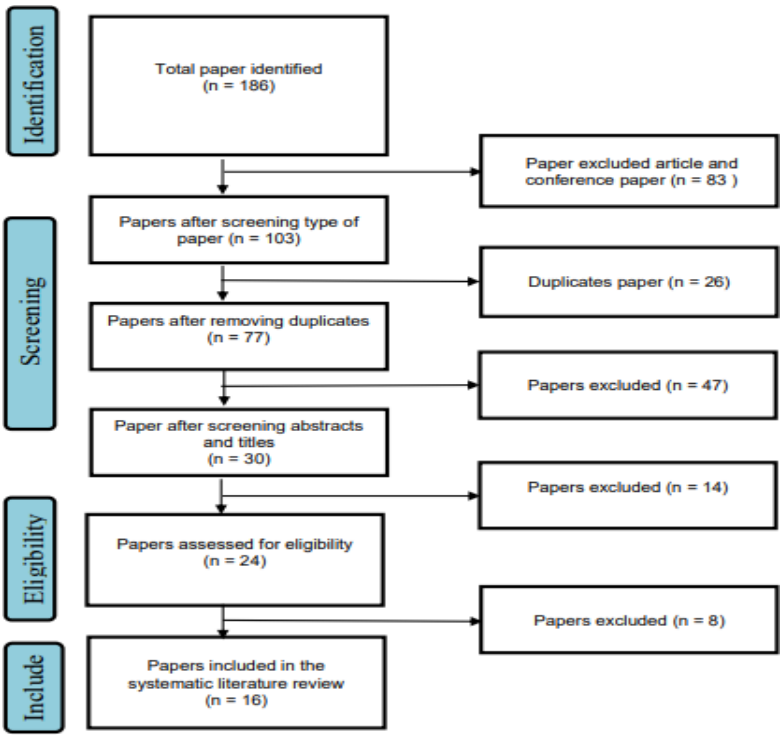

Figure 1. Flowchart depicting the selection of studies

Results

During these phases, the articles were summarized and presented in a tabular format, which included information about the study name, learning models, and level of study. A comprehensive breakdown of the incorporated studies can be found in Table 2.

Table 2. Characteristics of study

No.	Study Name	Learning Models	Level of Study
1	(Nurkamilah et al., 2018)	Realistic Mathematics Education	elementary school
2	(Syafi'i, 2018)	Teams Games Tournament	junior high school
3	(Surat, 2019)	Means Ends Analysis	junior high school
4	(Ulia et al., 2019)	Collaborative Learning	elementary school
5	(Saraseila et al., 2020)	Realistic Mathematics Education	elementary school
6	(Istiana et al., 2020)	Realistic Mathematics Education	elementary school
7	(Aritonang & Safitri, 2021)	Blended Learning	senior high school
8	(Fadhilatullathifi et al., 2023)	Survey Question Read Reflect Recite Review	junior high school
9	(Kafiar et al., 2021)	Problem-Based Learning	junior high school
10	(Aini, 2021)	Learning Cycle	elementary school
11	(Arifin, 2022)	Problem-Based Learning	elementary school
12	(Nurlaela & Imami, 2022)	Problem-Based Learning	junior high school
13	(Tasman et al., 2022)	Reading to Learn	junior high school

No.	Study Name	Learning Models	Level of Study
14	(Kurnila et al., 2022)	Problem-Based Learning	junior high school
15	(Setyowati & Nurcahyo, 2023)	Missouri Mathematics Project	senior high school
16	(Maysarah et al., 2023)	Project Based Learning	junior high school

The resulting learning models

Based on the literature search results, several learning models were identified that can enhance students' mathematical literacy skills. These models include Problem-Based Learning (PBL), Realistic Mathematics Education (RME), Blended Learning (BL), Cooperative Team Games Tournament (TGT), Reading to Learn (R2L), Missouri Mathematics Project (MMP), Means Ends Analysis (MEA), Learning Cycle (LC), Survey Question Read Reflect Recite Review (SQ4R), Project-Based Learning (PjBL), and the Collaborative Learning model. These models have been recognized as effective approaches for improving students' mathematical literacy skills. The arrangement of these learning models is visually represented in Figure 2.

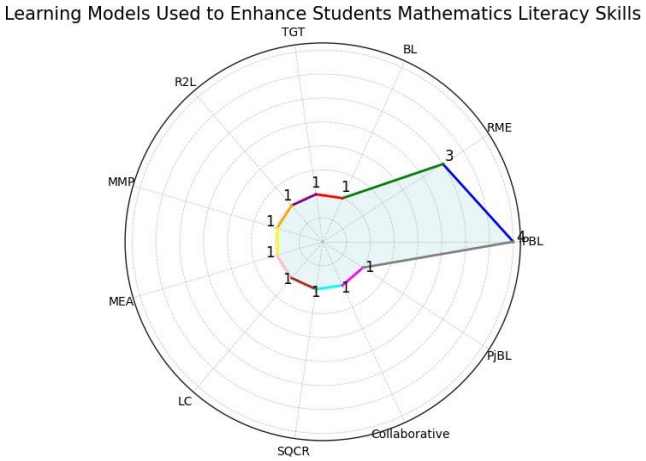

Figure 2. Learning models

Year of Study

According to Table 2, data is depicted by the year of publication, mirroring the representation in Figure 3.

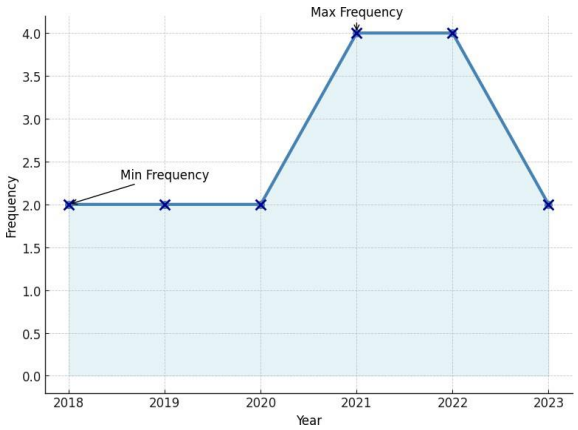

Figure 3. Data categorization according to the study's year

The annual count of publications on enhancing mathematical literacy through instructional models has shown a consistent upward trend, with a notable exception expected in 2023. In 2021, four articles were published discussing models such as Blended Learning models, Problem-Based Learning, the Learning Cycle, and SQ4R models. In 2022, four articles focusing on Problem-Based Learning and Reading to Learn models were indexed by SINTA. The increasing number of publications each year highlights the growing importance of research aimed at improving mathematical literacy through the application of various teaching models.

Level of Study

The results of educational levels from sixteen main studies are presented in Figure 4.

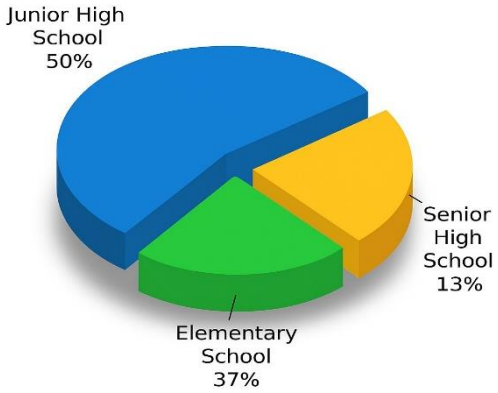

Figure 4. Data categorization according to the level of study

Research on mathematical literacy and learning models is conducted at every level of education. As shown in Figure 4, most research on mathematical literacy and learning models focuses on junior high schools. This emphasis is important for understanding students' mathematical abilities, exploring the effectiveness of various learning approaches, and identifying strategies to enhance mathematical literacy skills. By focusing on junior high schools, researchers can target interventions and support students during a critical stage of their mathematical development (Khaesarani & Ananda, 2022).

Junior high school is a critical period for building a strong foundation in mathematics. The concepts taught during these years form the basis for more advanced math courses in high school and beyond (Fardian, Suryadi, et al., 2024). Junior high school students are typically at an age where their cognitive development allows them to grasp more complex mathematical concepts, making it an ideal time to implement various learning models aimed at improving mathematical literacy (Putri, Juandi, Jupri, et al., 2024). As a result, educators and researchers often prioritize these years to ensure that students establish a solid mathematical understanding. Additionally, minimum competency assessments have been developed to measure the mathematical literacy of junior high school students. These assessments aim to identify the core competencies students should possess in terms of mathematical literacy. By evaluating students' mathematical literacy skills, educators can identify areas that need improvement and develop targeted interventions to enhance students' abilities.

Although research on mathematical literacy is predominantly focused on junior high schools, it is essential to recognize that this research is also conducted at various educational

levels. Researchers may choose to focus on junior high schools due to the factors mentioned, but valuable research is also conducted at the elementary, senior high school, and higher education levels to address mathematical literacy at different stages of a student's academic journey. This offers a valuable reference for future research that could explore mathematical literacy at the elementary, senior high school, or higher education levels.

Discussion

Mathematical literacy is an important skill that empowers individuals to solve practical problems, think critically, and apply mathematical reasoning in real-world situations (Stacey, 2011). Among the various pedagogical models, Problem-Based Learning (PBL) plays a significant role in developing these competencies. PBL encourages lifelong learning skills by involving students in real-world problems, thus enhancing their ability to apply mathematical reasoning in meaningful contexts (Fardian & Dasari, 2023; Kafiar et al., 2021; Kurnila et al., 2022). This model has become widely adopted in Indonesia because it aligns well with the principles of Merdeka curriculum, which emphasizes student-centered learning, problem-solving, and the development of critical thinking. PBL is especially relevant in this context as it promotes active learning and collaborative problem-solving, which are central to the curriculum's goals. PBL is preferred by teachers, particularly for topics in mathematics that are abstract or require higher-order thinking, such as algebra, geometry, and calculus. This is because PBL encourages students to engage in real-world problems where they must apply abstract mathematical concepts, facilitating deeper understanding and retention. Empirical studies show that PBL fosters critical thinking, collaboration, and problem- solving, which are essential components of mathematical literacy (Arifin, 2022; Nurlaela & Imami, 2022). However, while PBL promotes active learning and critical engagement, it can be time-consuming and pose challenges for students who are less accustomed to independent learning, which may limit its effectiveness in some settings (Sari et al., 2024).

Realistic Mathematics Education (RME) is a model that bridges the gap between abstract mathematical concepts and students' real-life experiences, making mathematics more accessible and relevant (Laurens et al., 2017). By using real-life problems and tangible objects from students' daily lives, RME enhances student engagement and improves academic performance (Putri, Juandi, Turmudi, et al., 2024). This model directly supports mathematical literacy by linking mathematics to everyday life, helping students understand the practical application of mathematical concepts (Istiana et al., 2020; Saraseila et al., 2020). However, integrating real-life contexts into lessons may require significant resources, which may not always be feasible in all educational settings (Nurkamilah et al., 2018).

Blended Learning (BL) combines traditional face-to-face learning with online instruction, offering a flexible and personalized learning experience (Bonk & Graham, 2012). By providing various media and technologies, BL supports diverse learning styles and enhances student engagement, which is crucial for fostering mathematical literacy (Aritonang & Safitri, 2021). Research indicates that BL promotes student motivation and academic success, as it allows learners to explore mathematical concepts at their own pace and apply

them in real-world contexts (Putri, Juandi, & Turmudi, 2024a). However, the reliance on technology can be a barrier in areas with limited access to digital resources, posing a challenge to its widespread implementation.

The Cooperative Team Games Tournament (TGT) model utilizes group-based games to encourage cooperation and active participation in the learning process. This cooperative learning model enhances mathematical literacy by promoting teamwork and mathematical communication (Syafi'i, 2018). By engaging in educational games and tournaments, students develop their mathematical reasoning skills while collaborating with their peers (Fardian, Herman, et al., 2024). However, a potential limitation of TGT is that the competitive nature of the games may lead to unequal participation, where some students dominate the activities while others may not engage fully (Mulyani et al., 2018).

Reading to Learn (R2L) is a model that focuses on improving reading comprehension, a critical skill for understanding mathematical problems. Through strategies such as summarizing and questioning, R2L helps students develop the ability to analyze and interpret complex mathematical texts, directly contributing to their mathematical literacy (Tasman et al., 2022). While R2L strengthens critical thinking and reading skills, it may not directly enhance problem-solving abilities, which are also essential components of mathematical literacy.

The Missouri Mathematics Project (MMP) integrates problem-solving and collaborative learning techniques to improve students' mathematical literacy and reasoning. By providing opportunities for students to work on real-world problems, MMP encourages the application of mathematical knowledge in practical scenarios (Setyowati & Nurcahyo, 2023). This approach enhances mathematical reasoning and self-confidence, preparing students for future challenges. However, the collaborative nature of MMP may not suit all students, especially those who prefer working individually (Rahma et al., 2022).

Means-Ends Analysis (MEA) focuses on problem-solving strategies that encourage students to break down complex problems into smaller, more manageable steps, which is crucial for mathematical literacy. MEA teaches students to analyze problems systematically and identify relationships between various elements, enhancing their mathematical reasoning (Surat, 2019). One limitation of MEA is that it requires a structured approach, which may be challenging for students who are not familiar with such techniques or who need more guidance in applying them.

The Learning Cycle (LC) model encourages students to actively explore new concepts, construct their understanding, and apply knowledge in various contexts. By involving students in hands-on activities, LC fosters critical thinking and problem-solving, essential for mathematical literacy (Aini, 2021). While LC promotes inquiry-based learning and deeper conceptual understanding, it may require more time and resources compared to traditional teaching methods, which can be a limitation in some classrooms.

The SQ4R model is a reading comprehension strategy designed to help students actively engage with texts. It enhances students' ability to understand and retain mathematical material by encouraging them to survey, question, read, reflect, recite, and review the content (Fadhilatullathifi et al., 2023). While SQ4R strengthens comprehension skills, it may not

directly address students' ability to apply mathematical concepts to solve problems, which is another crucial component of mathematical literacy.

Project-Based Learning (PjBL) encourages students to work on real-world projects, promoting active learning, collaboration, and problem-solving. By engaging in projects that require critical thinking and creativity, students develop their mathematical literacy and deepen their understanding of the subject matter (Maysarah et al., 2023). However, PjBL can be resource-intensive and time-consuming, which may pose challenges for some educational settings.

Finally, the Collaborative Learning model emphasizes cooperative learning strategies and group work. By working together, students share ideas, solve problems, and develop critical thinking and communication skills. This model fosters a positive learning environment and enhances mathematical literacy by encouraging students to actively engage with mathematical concepts (Ulia et al., 2019). However, unequal participation in group work can limit the effectiveness of collaborative learning for some students.

These learning models offer various approaches to enhancing mathematical literacy. Each model provides students with opportunities to engage with mathematical content, develop problem-solving skills, and apply their knowledge in real-world contexts. By integrating these models into teaching practices, educators can create a more effective and engaging learning environment, fostering a deeper understanding of mathematical concepts and improving students' overall mathematical literacy. However, a gap in the literature remains regarding the adoption of certain learning models in the Indonesian context. One model that is rarely studied in Indonesia but shows promise in other regions is Blended Learning. While Blended Learning has been widely recognized as an effective pedagogical approach internationally, its application in Indonesia has been limited. This is largely due to the uneven development of technology-enhanced learning resources across different regions of the country. As a result, the integration of digital tools and online platforms into the classroom remains a challenge, particularly in rural and remote areas. This disparity in access to technology presents a unique opportunity for future research to explore how Blended Learning can be adapted to the Indonesian context, particularly in terms of overcoming infrastructural challenges and ensuring equitable access to technology for all students.

Conclusion

Mathematical literacy holds significant importance due to its profound impact on individuals' daily lives, encompassing activities such as practical problem-solving, the cultivation of critical thinking, and the development of analytical skills. Proficiency in mathematical literacy enables individuals to actively engage in innovation and technological advancements. Consequently, mathematical literacy not only equips individuals to address everyday challenges but also plays a crucial role in fostering personal growth and driving the socio-economic development of a nation. This highlights the contemporary relevance of mathematical literacy. The careful selection of pedagogical models can have a substantial influence on improving students' mathematical literacy. Pedagogical approaches that emphasize interactivity, problem-solving

support, and a strong focus on mathematical concepts tend to yield more favorable outcomes in the effort to enhance mathematical literacy. However, it is important to acknowledge the limitations of this review. The articles included were primarily sourced from Indonesian journals, specifically those listed in the SINTA database, in order to focus the review within the context of Indonesian education. Consequently, articles not indexed by SINTA, or those published in international journals, were not included in the review. This limitation was intentional to narrow the scope and ensure the findings are directly relevant to the educational landscape in Indonesia.

While research on mathematical literacy is often concentrated on junior high schools, it is essential to recognize that research is also conducted at various educational levels. This offers valuable insights for future research at the elementary, senior high school, or higher education levels. Additionally, this research emphasizes the critical importance of continuous assessment in monitoring the progress of students' mathematical literacy. By periodically assessing outcomes and providing constructive feedback, educators can track the development of students' skills and effectively identify areas requiring improvement. This study has limitations in its scope, particularly regarding the diversity of educational contexts and student demographics. Future research should address these gaps by investigating the effectiveness of the identified learning models across various educational settings and among diverse student populations. Furthermore, exploring the role of technology integration and the impact of teacher professional development on the implementation of these models would provide valuable insights for improving mathematical literacy.

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Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this manuscript. In addition, the authors have completed the ethical issues, including plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies.

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Author Contributions

ADP: Conceptualization, Methodology, Formal Analysis, Writing – Original Draft; **DJ**: Methodology, Validation, Supervision; **T**: Validation and supervision, **DF**: Software, Resources, Writing – Review & Editing, Visualization; **Y**: Methodology, Validation

References

Aini, S. (2021). Penerapan Model Learning Cycle Untuk Meningkatkan Kemampuan Literasi Matematika. *JEMARI (Jurnal Edukasi Madrasah Ibtidaiyah)*, *3*(2), 83–89. https://doi.org/10.30599/jemari.v3i2.900

Arifin, N. (2022). Efektivitas Model Pembelajaran Problem Based Learning Ditinjau Dari Kemampuan Literasi Matematika Dan Rasa Ingin Tahu Peserta Didik Di Sekolah Dasar. *Pendas Mahakam : Jurnal Pendidikan Dan Pembelajaran Sekolah Dasar*, *7*(1), 9–17. https://doi.org/10.24903/pm.v7i1.1015

Aritonang, I., & Safitri, I. (2021). Pengaruh Blended Learning Terhadap Peningkatan Literasi Matematika Siswa. *Jurnal Cendekia : Jurnal Pendidikan Matematika*, *5*(1), 735–743. https://doi.org/10.31004/cendekia.v5i1.555

Artiluhung, R. R., Mahendra, A., Yulianto, A. G., & Aman, M. S. (2024). Systematic literature review: Strategies for active and creative learning in Elementary School Physical Education. *ACTIVE: Journal of Physical Education, Sport, Health and Recreation*, *13*(3), 542-547.

Bonk, C. J., & Graham, C. R. (2012). *The handbook of blended learning: Global perspectives, local designs*. Wiley+ ORM.

Davies, D., Jindal-Snape, D., Collier, C., Digby, R., Hay, P., & Howe, A. (2013). Creative learning environments in education—A systematic literature review. *Thinking skills and creativity*, *8*, 80-91.

Fadhilatullathifi, Z. N., Rahmawati, F., & Chasanah, A. N. (2023). Efektivitas model pembelajaran survey question read reflect recite review (sq4r) untuk meningkatkan kemampuan literasi matematika pada materi sistem persamaan linear dua variabel. *Jurnal Lebesgue : Jurnal Ilmiah Pendidikan Matematika, Matematika Dan Statistika*. https://api.semanticscholar.org/CorpusID:258954977

Fardian, D., & Dasari, D. (2023). The effects of problem-based learning on mathematical proficiency: A combined bibliometric analysis and meta-analysis review. *Journal of Didactic Studies*, *1*(2), 99–113.

Fardian, D., Herman, T., Suryadi, D., & Prabawanto, S. (2024). Gamifying Mathematics: A hermeneutic phenomenological study focused on Role-Playing Games in Linear Equations. *PYTHAGORAS Jurnal Pendidikan Matematika*, *19*(1).

Fardian, D., Suryadi, D., Prabawanto, S., & Jupri, A. (2025). Integrating Chat-GPT in the Classroom: A Study on Linear Algebra Learning in Higher Education. *International Journal of Information and Education Technology*, *15*(4).

Fardian, D., Suryadi, D., & Prabawanto, S. (2024). Students ' Learning Obstacles in Solving Mathematical Proficiency Tasks : A Hermeneutic Phenomenological Study Focused on Algebra. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *15*(2), 593–618.

Fardian, D., Suryadi, D., & Prabawanto, S. (2025). A praxeological analysis of linear equations in Indonesian mathematics textbooks: Focusing on systemic and epistemic aspect. *Journal on Mathematics Education*, *16*(1), 225–254. https://doi.org/10.22342/jme.v16i1.pp225-254

Hikmah, R., Astuti, L. S., & Selvia, N. (2024). Self-directed learning : a key factor in mathematical. *Lentera Sriwijaya : Jurnal Ilmiah Pendidikan Matematika*, *6*(1), 1–13.

Hwang, J., & Ham, Y. (2021). Relationship between mathematical literacy and opportunity to learn with different types of mathematical tasks. *Journal on Mathematics Education*, *12*(2), 199–222. https://doi.org/10.22342/JME.12.2.13625.199-222

İDİL, Ş., GÜLEN, S., & DÖNMEZ, İ. (2024). What Should We Understand From PISA 2022 Results? *Journal of Steam Education*, *7*(1), 1–9. https://doi.org/10.55290/steam.1415261

Istiana, M. E., Satianingsih, R., & Yustitia, V. (2020). The Influence of Realistic Mathematics Education on Students' Mathematical Literacy Skills. *UNION: Jurnal Ilmiah Pendidikan Matematika*, *8*(3), 423–430. https://doi.org/10.30738/union.v8i3.8446

Kafiar, E., Weyai, S., Tambusai, M. H.-J. P., & 2021, undefined. (2021). Efektivitas Model Pembelajaran Problem Based Learning terhadap Kemampuan Literasi Matematika Berbasis Higher Order Thinking Skill (HOTS) pada SMP YPK 2. *Jptam.Org*, *05*(01), 735–743. https://www.jptam.org/index.php/jptam/article/view/2695

Khaesarani, I. R., & Ananda, R. (2022). Students' Mathematical Literacy Skills in Solving Higher-Order Thinking Skills Problems. *Al-Jabar Jurnal Pendidikan Matematika*. https://doi.org/10.24042/ajpm.v13i1.11499

Kurnila, V. S., Badus, M., Jeramat, E., & Ningsi, G. P. (2022). Peningkatan Kemampuan Literasi Matematika Melalui Pendekatan Problem Based Learning Bermuatan Penilaian Portofolio. *Euler : Jurnal Ilmiah Matematika, Sains Dan Teknologi*, *10*(1), 88–97. https://doi.org/10.34312/euler.v10i1.13963

Laurens, T., Batlolona, F. A., Batlolona, J. R., & Leasa, M. (2017). How Does Realistic Mathematics Education (RME) Improve Students' Mathematics Cognitive Achievement? *Eurasia Journal of Mathematics Science and Technology Education*. https://doi.org/10.12973/ejmste/76959

Maysarah, S., Saragih, S., & Napitupulu, E. (2023). Peningkatan Kemampuan Literasi Matematik Dengan Menggunakan Model Project-Based Learning. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *12*(1), 1536.

Mulyani, R., Djumhana, N., & Syaripudin, T. (2018). Penerapan model pembelajaran kooperatif Team Games Tournament (tgt) untuk meningkatkan kemampuan kerja sama siswa sekolah dasar. *Jurnal Pendidikan Guru Sekolah Dasar*, *3*(2), 38–45.

Nurkamilah, M., M Fahmi, N., & Aep, S. (2018). Mengembangkan Literasi Matematika Siswa Sekolah Dasar melalui Pembelajaran Matematika Realistik Indonesia. *Jurnal Theorems (The Original Research of Mathematics)*, *2*(2), 70–79.

Nurlaela, E., & Imami, A. I. (2022). Peningkatan Kemampuan Literasi Matematika Siswa Melalui Penerapan Model Pembelajaran Problem Based Learning Di Kelas VII SMPIT Insan Harapan. *Jurnal Ilmiah Dikdaya*, *12*(1), 33.

OECD. (2023). *PISA 2022 Results (Volume II)*. https://doi.org/10.1787/a97db61c-en

Putri, A. D., Juandi, D., Jupri, A., Turmudi, T., & Muchsin, S. B. (2024). Mastering the TPACK framework: Innovative approaches by mathematics teachers. *Jurnal Elemen*, *10*(3), 582–594. https://doi.org/10.29408/jel.v10i3.26311

Putri, A. D., Juandi, D., & Turmudi, T. (2024a). *Blended Learning dalam Pembelajaran Matematika: A Systematic Literature Network Analysis*. *7*(3), 501–516. https://doi.org/10.22460/jpmi.v7i3.21992

Putri, A. D., Juandi, D., & Turmudi, T. (2024b). Realistic mathematics education and mathematical literacy: a meta-analysis conducted on studies in Indonesia. *Journal of Education and Learning (EduLearn)*, *18*(4), 1468–1476. https://doi.org/10.11591/edulearn.v18i4.21650

Putri, A. D., Juandi, D., Turmudi, T., Fardian, D., & Rizki, L. M. (2024c). Does The Realistic Mathematics Education Approach Enhance Students' Mathematical Literacy? A Systematic Literature Review. *Avalokana Journal of Literature Review*, *1*(1), 30–37.

Putri, A. D., Juandi, D., Turmudi, T., & Suparman, S. (2025). Blended Learning and Math Achievement: A Meta-Analytic Review Highlighting the Effectiveness and

Heterogeneity. *Electronic Journal of E-Learning*, *23*(1), 113–128. https://doi.org/10.34190/ejel.23.1.3781

Putri, A. D., Yerizon, Y., Arnellis, A., & Suherman, S. (2024). Development of realistic mathematics education-based teaching materials to increase students' mathematical literacy ability. *AIP Conference Proceedings*, *3024*(1).

Rahma, M., Usman, U., & Ahsan, M. (2022). The Effect of the Missouri Mathematics Project Learning Model on the Tenth Grade Student's Mathematical Literacy Ability in Gender Perspective. *Jurnal Pendidikan Matematika.*

Saraseila, F., Karjiyati, V., & Agusdianita, N. (2020). The Impact of the Realistic Mathematics Education Model on the Mathematical Literacy Skills of Fifth-Grade Students in Primary Schools in Cluster XIV Bengkulu City. *Jurnal Math-UMB.EDU*, *7*(2). https://doi.org/10.36085/math-umb.edu.v7i2.724

Sari, F. A., Trisnawati, F. F., Supentri, S., & Isjoni, M. Y. R. (2024). Digital Literacy- Based Case Method Lecture Model for Strengthening Student Critical Thinking. *AL-ISHLAH: Jurnal Pendidikan*, *16*(1), 336–344. https://doi.org/10.35445/alishlah.v16i1.4576

Setyowati, E., & Nurcahyo, A. (2023). Effectiveness of Missouri Mathematics Project (MMP) Learning Model on Students' Mathematical Literacy Skills in View of Self-Efficacy . *Jurnal Pendidikan Matematika*, *13*(02).

Stacey, K. (2011). The PISA view of mathematical literacy in Indonesia. *Journal on Mathematics Education*, *2*(2), 95–126. https://doi.org/10.22342/jme.2.2.746.95-126

Surat, I. M. (2019). Pengaruh Model Pembelajaran Means Ends Analysis (MEA) terhadap Apresiasi Matematika dan Literasi Matematika Peserta Didik Kelas VII SMP Negeri 6 Denpasar Tahun Pelajaran 2017 / 2018. *Jurnal EMASAINS*, *8*(1), 8–17.

Syafi'i, M. (2018). Semangat Literasi Matematika pada Pengembangan Model Pembelajaran Kooperatif Teams Games Tournament (TGT) Guna Meninggkatkan Hasil Belajar Matematika Siswa. *Jurnal Ilmu Pendidikan (JIP) STKIP Kusuma Negara*, *9*(2), 85–94.

Tasman, F., Dewanti, A., Hutapea, D. W., Kurnia SN, P. A., & Lubis, A. S. (2022). Pengaruh Model Pembelajaran Reading To Learn Terhadap Kemampuan Literasi Matematika Siswa Pada Materi Persamaan Kuadrat. *AKSIOMA: Jurnal Program Studi Pendidikan Matematika*, *11*(3), 1749. https://doi.org/10.24127/ajpm.v11i3.4535

Ulia, N., Saputri, R. D., & Kusumadewi, R. F. (2019). Model Collaborative Learning Berbantuan Media Ekspresomatika Terhadap Literasi Matematika Siswa Sekolah Dasar. *Jurnal Ilmiah Pendidikan Dasar*, *6*(1), 45. https://doi.org/10.30659/pendas.6.1.45-57

Valverde-Berrocoso, J., Garrido-Arroyo, M. D. C., Burgos-Videla, C., & Morales-Cevallos, M. B. (2020). Trends in educational research about e-learning: A systematic literature review (2009–2018). *Sustainability*, *12*(12), 5153.

Wijaya, T. T., Hidayat, W., Hermita, N., Alim, J. A., & Talib, C. A. (2024). Exploring Contributing Factors to PISA 2022 Mathematics Achievement: Insights From Indonesian Teachers. *Infinity Journal*, *13*(1), 139–156. https://doi.org/10.22460/infinity.v13i1.p139-156