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Teachers' Strategies in Enhancing Numeracy Skills in Elementary Schools

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Abstract

Numeracy skills are essential competencies that every student must possess. However, results from international assessments such as PISA indicate that Indonesian students' numeracy literacy remains relatively low, necessitating more effective instructional strategies. This study aims to identify and analyze various strategies employed by teachers to enhance elementary students' numeracy literacy through a literature review approach. The method used is a content analysis-based literature review focusing on publications from the last ten years. The literature search was conducted systematically using several reputable academic databases, including Scopus, ScienceDirect, SpringerLink, and Google Scholar. Keywords used in the search included: teacher strategies, numeracy literacy, elementary mathematics education, numeracy pedagogy, elementary education, and teacher practice in numeracy. The findings indicate that strategies such as blended learning, Realistic Mathematics Education (RME), problem-based learning (PBL), differentiated instruction, and game-based learning consistently have a positive impact on improving students' numeracy literacy. These strategies support learning processes that are more adaptive, contextual, and engaging, while effectively fostering students' critical thinking, collaboration, and problem-solving skills.

Keyword: *Numeracy Literacy, Teacher Strategies, Primary Education, Mathematics Learning*

Introduction

In today's era, numeracy literacy has become an essential skill that elementary school students must possess. Numeracy literacy refers to the ability to apply fundamental mathematical concepts to solve everyday problems (Fauzan et al., 2024). It goes beyond mere computational skills, encompassing logical thinking, problem-solving, and data-informed decision-making in daily life (Daryanes et al., 2023). Numeracy literacy helps students perceive mathematics as an integral part of their lives rather than merely a rigid and confusing school subject (Dewida et al., 2023). Therefore, fostering numeracy literacy from an early age not only equips students with basic arithmetic skills but also prepares them to face real-life challenges that require logical reasoning, analytical thinking, and sound decision-making.

However, in practice, many students still struggle to grasp fundamental numeracy concepts. The Organisation for Economic Co-operation and Development (OECD) has reported that students' achievements in literacy, numeracy, science, and mathematics have shown little consistent improvement in recent years. This is evident in Indonesia's 2022 Programme for International Student Assessment (PISA) score of 366, which falls well below the OECD average of 472, placing Indonesia at rank 70 out of 81 participating countries (Sutrimo et al., 2024). These difficulties extend beyond calculation skills to students' ability to interpret numbers within everyday contexts (Utari et al., 2019). Challenges in literacy and numeracy during primary education can significantly hinder the development of students' mathematical abilities (Sidiq et al., 2023).

In this context, teachers play a critical role as the primary facilitators of numeracy instruction. The strategies they employ not only determine the extent to which students comprehend the material but also influence students' attitudes toward mathematics. Contextual approaches, the use of interactive multimedia, and the integration of game-based or experiential learning methods have proven effective in enhancing students' interest and understanding of numeracy (Apriyanti et al., 2023). However, not all teachers have equal access to training and instructional resources that support creative numeracy strategies (Ismawati & Puspita, 2024). Some still rely on conventional methods such as lectures and repetitive exercises, which are less effective in fostering comprehensive numeracy skills (Sutriyani et al., 2024). Moreover, challenges such as time constraints, curriculum limitations, and varied student abilities also hinder the implementation of innovative instructional strategies (Dewi et al., 2025).

Although numeracy literacy has become a central focus in various educational policies, including the Kurikulum Merdeka (Independent Curriculum), previous research has largely concentrated on students' cognitive aspects and mathematical learning outcomes. Studies exploring teacher strategies for developing numeracy literacy remain limited. Many have focused on assessing students' numeracy levels without delving into how teaching and learning processes are constructed and brought to life by teachers. Yet, the strategies chosen by teachers significantly shape how students experience numeracy learning emotionally, socially, and contextually. Therefore, there is a need for a literature review that specifically maps and analyzes the strategies employed by elementary school teachers in enhancing students' numeracy literacy.

Methods

This study employed a Systematic Literature Review (SLR) approach based on the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework. This approach was selected to gain an in-depth understanding of teacher strategies for enhancing

numeracy literacy in elementary schools, based on findings from various relevant previous studies.

The literature search was conducted systematically through several reputable academic databases, including Scopus, ScienceDirect, SpringerLink, and Google Scholar. The search employed a combination of keywords in both Indonesian and English, such as: "strategi guru" (teacher strategy), "literasi numerasi" (numeracy literacy), "pembelajaran matematika SD" (elementary mathematics learning), "teacher strategy", "numeracy pedagogy", "elementary education", and "problem-based learning". To ensure the relevance and quality of the articles, the following criteria were applied:

Table 1. Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Articles published between 2015–2025	Articles published before 2015
Focus on teacher strategies in numeracy instruction	Focus only on assessment without instructional strategies
Context of primary education (Elementary School)	Studies at junior/high school, higher education, or adult learning
Peer-reviewed scholarly articles with full-text access	Opinion pieces, non-peer-reviewed articles, or not available in full

The data obtained were analyzed using content analysis. Each article was examined to identify: (1) the types of instructional strategies used by teachers, (2) the context of strategy implementation in elementary schools, (3) the impact or effectiveness of the strategies on students' numeracy skills. The results of this analysis were then categorized into major themes, which are presented in the results and discussion section.

Result

Based on the results of a thorough literature search and analysis, several common strategies employed by teachers to enhance numeracy literacy at the elementary school level were identified. The relevant findings from the literature review are presented in Table 2.

Table 2. Summary of Teacher Strategies for Enhancing Numeracy Literacy among Elementary School Students

No	Researcher and Year	Research Method	Instructional Strategy	Research Findings
1	Rahmawati et al., 2023	Systematic Literature Review	Model blended learning	The use of the blended learning model has a more effective impact on students' numeracy literacy skills.
2	Fauzan et al., 2024	Desain Factorial	Realistic Mathematics Education (RME)	Students' numeracy skills improve with the implementation of RME instruction.
3	Siregar & Siagian, 2024	Desain quasi-eksperimen	Problem-Based Learning (PBL)	Enhancing students' numeracy literacy, critical thinking, and problem-solving skills.
4	Klerlein & Hervey, 2022	Desain quasi-eksperimen	Problem-Based Learning	The problem-based learning strategy can

				improve students' numeracy skills.
5	Nisa, 2023	Classroom Action Research	Problem-Based Learning (PBL) berbantu quizizz	The use of the Quizizz application improved students' numeracy skills by 53% in the first cycle, 75% in the second cycle, and 94% in the third cycle.
6	Barus et al., 2023	Qualitative Approach	RME	By using the Realistic Mathematics Education (RME) model, students' numeracy literacy both inside and outside the classroom can be positively influenced, supporting the development of their individual skills and talents.
7	Samsiyah, 2023	Descriptive Qualitative	Differentiated Instruction Strategy	Enhancing numeracy literacy
8	Pangestika et al., 2025	Descriptive Qualitative	Educational Games	It can help students understand basic mathematical concepts in an enjoyable way.
9	Arfika Nurul, 2024	Classroom Action Research	RME	The implementation of the RME approach increased the numeracy skills of fifth-grade students by 50% in the first cycle and further improved to 84% in the second cycle.
10	Nurrohmah & Mardiyana, 2023	Desain One-Group Pretest-Posttest Design	RME	The hypothesis testing using a paired sample t-test yielded a value of 20.769, indicating that H1 was accepted and H0 was rejected. The p-value of 0.000 < 0.05 signifies a significant effect of the Realistic Mathematics Education (RME) approach on students' numeracy literacy skills.
11	Munawaroh & Fatmawati, 2025	Classroom Action Research	RME	Numeracy learning using the Realistic Mathematics Education (RME) approach showed improvement at each stage

Discussion

Based on the literature review findings, it is evident that elementary school teachers apply a variety of pedagogical strategies designed to enhance students' numeracy literacy. These strategies include blended learning, Realistic Mathematics Education (RME), problem-based learning (PBL), differentiated instruction, and educational games. These five approaches are not only content-oriented but also consider the affective, cognitive, and contextual dimensions of mathematics learning. In the context of 21st-century competencies, strategies such as blended learning, RME, and PBL aim not only to improve students' cognitive outcomes but also to build competencies such as critical thinking, problem-solving, collaboration, and mathematical communication (Dewanti et al., 2020).

First, the blended learning approach provides flexibility in numeracy instruction, particularly through the integration of face-to-face and digital learning. This flexibility allows teachers to adapt instructional methods to meet students' needs and learning conditions (Müller et al., 2023). Blended learning enables students to independently explore numerical concepts while receiving direct feedback from teachers (Schmid et al., 2023). In line with this, the use of platforms such as Learning Management Systems (LMS), interactive videos, and digital exercises contributes to enhancing symbolic representation and basic numerical understanding (Larkin & Calder, 2016). Thus, blended learning not only facilitates access to materials but also strengthens conceptual understanding through purposeful use of technology.

Second, the Realistic Mathematics Education (RME) approach emphasizes the contextualization of mathematical content within students' real-life experiences. In RME, learning begins from meaningful situations familiar to students (Sumirattana et al., 2017). This approach allows students to develop mathematical understanding through direct experience (Apriyanti et al., 2023). This aligns with the principle that real-world contexts can improve students' engagement and understanding of abstract mathematical concepts (Clarke & Roche, 2018). RME is relevant to the development of modeling and mathematical reasoning competencies (Kandemir & Eryilmaz, 2025). Through RME, students are encouraged to construct mathematical models from everyday situations that help them comprehend and apply mathematical concepts (Nurlatifah et al., 2025). Models in RME serve as a bridge between concrete contexts and mathematical abstraction, enabling students to gradually build understanding (Zahro et al., 2025). Modeling ability is essential in numeracy literacy. The OECD emphasizes that numeracy literacy not only includes arithmetic skills but also the capacity to apply mathematical concepts in unfamiliar situations requiring strong modeling and reasoning (Boeren & Íñiguez-Berrozpe, 2022). Therefore, the RME approach, which emphasizes modeling and contextualization, is highly relevant to improving students' numeracy literacy.

Third, Problem-Based Learning (PBL) is an instructional strategy that emphasizes exploration and problem-solving. In the context of numeracy literacy, PBL significantly contributes to the development of critical thinking, logical reasoning, and the ability to solve complex problems (Bahri, 2025). Through PBL, students are engaged in identifying contextual problems, formulating hypotheses, exploring numerical data, and evaluating solutions based on evidence-based reasoning (Rehman et al., 2024). This aligns with Fullan and Langworthy's (2014) perspective that problem-based learning encourages a shift from

passive to active learning (Ang et al., 2021). Thus, PBL not only sharpens students' cognitive skills but also cultivates an active and adaptive learning character in addressing real-life numerical problems.

Fourth, differentiated instruction is a strategy designed to address student diversity (Langelaan et al., 2024). This approach allows teachers to tailor content to individual student needs, creating an effective learning environment (Safarati & Zuhra, 2023). Implementing differentiated instruction has been shown to enhance student engagement and learning outcomes in mathematics (Prast et al., 2018). The principles of differentiated instruction emphasize the importance of flexibility in content delivery, instructional methods, and assessment to accommodate diverse learning needs (Langelaan et al., 2024). Thus, this strategy not only ensures equitable learning opportunities in numeracy but also provides space for students to learn according to their abilities and needs.

Fifth, game-based learning is a strategy that integrates instructional processes with gameplay (Fatafani, 2025). Game-based learning refers to the use of video games and related elements such as reality-based content, instructional materials, and visuals within the learning process (Juhanaini et al., 2025). This strategy enhances students' understanding, knowledge, and evaluation of content in an enjoyable way (Winatha & Setiawan, 2020). The implementation of game-based learning has been proven to improve elementary students' numeracy (Meliana et al., 2025). Several studies have demonstrated that game-based learning offers numerous benefits for both students and teachers (Ardani & Salsabila, 2021). Thus, game-based learning not only creates a more engaging learning environment but also bridges cognitive and emotional aspects in numeracy education.

The findings indicate that teacher strategies to enhance numeracy literacy are diverse, reflecting a growing awareness of the need for adaptive and contextual approaches in elementary school settings. Broadly, these strategies can be categorized into five main approaches: blended learning, Realistic Mathematics Education (RME), problem-based learning (PBL), differentiated instruction, and educational games. These instructional strategies are designed to address real-world classroom challenges such as limited learning resources, low student motivation in mathematics, and minimal student engagement in critical thinking and problem-solving processes.

The interrelation among the factors examined reveals a strong link between instructional strategies and students' cognitive and affective aspects. For example, blended learning supports learning flexibility and numerical understanding by combining face-to-face interaction and digital technology. Meanwhile, RME and PBL are effective in enhancing logical and critical thinking skills through context-driven problem-solving. Differentiated instruction specifically addresses the issue of diverse learning needs, whereas educational games bridge cognitive and emotional elements by offering enjoyable yet meaningful learning experiences.

Each strategy highlighted in this review presents a unique value: blended learning excels in accessibility and technological integration; RME provides real-life context; PBL promotes active engagement and problem-solving; differentiated instruction supports educational equity; and educational games foster learning motivation through recreational means. Collectively, these five strategies significantly contribute to the advancement of numeracy

literacy, especially when integrated into instructional design aligned with the characteristics of elementary students.

Numeracy is an essential skill that every student must acquire in the 21st century. The term "numeracy" was first introduced in the Crowther Report (Ministry of Education) as a form of literacy involving quantitative thinking (Riyadi et al., 2024). Numeracy comprises components such as knowledge, understanding, and arithmetic skills used to express ideas or information through symbols, graphs, tables, and mathematical language (Yunarti & Amanda, 2022). Having numeracy skills enables individuals to navigate everyday life and provides a strong foundation for lifelong learning in mathematics (Gal et al., 2020). Therefore, students' numeracy skills need to be improved through appropriate instructional strategies.

Conventional strategies that focus solely on memorization or repetitive exercises are insufficient to foster numeracy skills. Instructional methods such as blended learning, RME, differentiated instruction, and game-based learning are considered effective because they address real-world challenges in elementary mathematics education. Blended learning offers flexibility by combining face-to-face and digital learning, allowing students to learn more independently. A study by Ayu Lestari found that students could utilize a variety of numbers and basic mathematical symbols and interpret information presented in multiple formats (e.g., graphs, tables, charts, and diagrams) (Lestari et al., 2022).

The RME approach facilitates students' understanding of concepts by presenting content based on daily experiences. Research by Yulia Agustina demonstrated that the use of RME had a positive impact on students' numeracy skills (Agustina et al., 2024). The Problem-Based Learning (PBL) strategy helps students develop critical thinking and realistic problem-solving habits. Research by Boangmanalu showed that after implementing PBL, there was a significant improvement in numeracy skills: the proportion of students in the moderate category increased by 20%, while those in the high category rose by 80% (Mu;arif et al., 2023).

Differentiated instruction allows teachers to tailor their teaching methods to students' individual needs. A study by Liliawati found that this approach increased students' numeracy skills by 26%. Meanwhile, game-based learning creates a more enjoyable and engaging learning process, making students more interested and less easily bored. This is consistent with Putri's findings, which showed an 11% increase in numeracy skills after using a game-based learning strategy. The implementation of appropriate instructional strategies has a positive impact on improving elementary students' numeracy literacy, not only cognitively but also affectively and socially. Students become more active, confident, and engaged in learning. These strategies also encourage teachers to be more creative, reflective, and adaptive in designing contextual learning experiences (Utami et al., 2025). Therefore, the teacher's role goes beyond knowledge transmission to becoming a learning facilitator who adjusts the learning process to the unique characteristics of the students (Lubis, 2019). This aligns with Vygotsky's social constructivist theory, which asserts that learning is more effective when students engage in social interaction and gradual learning processes that help them understand complex concepts (Yohanes, 2010).

Conclusion

Appropriate instructional strategies play a crucial role in improving elementary students' numeracy skills. Effective strategies for enhancing numeracy include blended learning, Realistic Mathematics Education (RME), Problem-Based Learning (PBL), differentiated instruction, and game-based learning. Blended learning provides flexibility by combining face-to-face interaction with digital technology, enabling students to learn more independently. The RME approach facilitates students' conceptual understanding by presenting material based on everyday experiences. PBL helps students develop critical thinking and realistic problem-solving skills. Differentiated instruction allows teachers to tailor teaching methods to each student's individual needs. Meanwhile, game-based learning makes the learning process more enjoyable and engaging, thus increasing student interest and reducing boredom. These strategies enable teachers to create adaptive, contextual, participatory, and enjoyable learning experiences.

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