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The Integration of Mathematics Reading Activities into Mathematics Instruction

Rr. Selvi Amelia Rahmawati[1*], Wahyu Sopandi[2], Turmudi[3], Yohanes Surya[4], Arie Rakhmat Riyadi[5]
[1,2,3,5]Education Deparment, Indonesia University of Education, West Java, Indonesia
[4]Education Deparment, Surya Institue, Tanggerang Banten, Indonesia

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ABSTRACT

Mathematics reading, encompassing the comprehension of mathematical texts, symbols, and visual representations, is a critical yet underexplored dimension of numeracy literacy. Many students struggle to connect textual information with mathematical concepts, leading to reduced problem-solving performance, especially in word problems under the National Curriculum. This study aims to examine the effectiveness, types, and impacts of mathematics reading activities, as well as the instructional strategies and classroom conditions that support their integration. Employing a Systematic Literature Review (SLR) of 19 Scopus-indexed empirical studies (2019–2024) using the PRISMA framework, the analysis highlights that activities such as close reading, text-to-symbol transformation, questioning strategies, and digital tools significantly enhance contextual understanding, problem modeling, and complex problem-solving skills. Among the identified approaches, the Gasing Method emphasizing gradual transition from concrete to abstract understanding, mental arithmetic, and intensive reading of problem texts aligns strongly with the needs of numeracy literacy development. Integration is most successful when supported by scaffolding, metacognitive strategies, and a literacy-rich learning environment. These findings suggest that embedding structured mathematics reading activities, including those within the Gasing Method framework, can foster literate, confident, and capable problem-solvers in elementary education while supporting the National Curriculum's emphasis on contextual and critical thinking

INTRODUCTION

Mathematics reading is the process of understanding complex mathematical texts, which includes not only verbal language but also symbols, visual representations such as graphs, tables, diagrams, and the distinctive logical structures found in mathematical texts (Agrusti et al., 2015; Kadunz, 2014). This activity requires students to integrate linguistic and numerical understanding, as well as logical thinking skills, to interpret the meaning of various forms of mathematical representation (Beaudine, 2022). Unlike reading ordinary narrative texts, reading mathematics involves a slow, careful, and reflective approach, as a single symbol or term can alter the entire meaning of a mathematical statement (Shepherd, 2005).

The urgency of mathematics reading is very high in the context of modern education because mathematical literacy is a key competency for 21st-century life. Mathematical literacy includes the ability to formulate, use, and interpret mathematics in real-life contexts, which is essential for everyday decision-making, such as in financial planning and data analysis (Maslihah et al., 2020; Steen et al., 2007). The ability to read mathematics also directly contributes to students' academic achievement and the development of higher-order thinking skills (Zhu & Wu, 2023). With the increasing complexity of the mathematics curriculum, students are not only required to perform calculations but also to understand and analyze information presented textually in word problems (Shao et al., 2025).

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Globally, the main challenges in mathematics reading involve difficulties in understanding semiotic representations, such as mathematical symbols and graphs, as well as the complexity of mathematical language, which often differs from everyday language (Ferretti et al., 2024; Planas et al., 2025). Cross-national studies also show that linguistic and cultural diversity in classrooms can further hinder mathematical comprehension, especially in multilingual settings (Planas et al., 2025). In addition, many students experience low levels of mathematical literacy, which negatively impacts their problem-solving abilities (Muhaimin et al., 2024).

In Indonesia, the challenges of mathematical literacy include students' low motivation to read and difficulties in understanding mathematical texts, particularly in the form of word problems or context-based texts (Agrusti et al., 2015; Maslihah et al., 2020). Research shows that students often struggle to connect textual information with relevant mathematical concepts, which leads to poor mathematics learning outcomes (Shepherd, 2005; Kadunz, 2014). This situation has been further exacerbated by the impact of the COVID-19 pandemic, which caused a significant decline in students' academic achievement, including in mathematics (Labrot & Defouw, 2024).

Efforts to address these challenges can be undertaken through various strategies. For example, the use of structured reading strategies and scaffolding in mathematics instruction has been proven to help students better understand mathematical representations (Rezat et al., 2022). Integrating linguistic support into mathematics teaching is also essential to help students navigate the complexities of mathematical language (Planas et al., 2025). In addition, technology-based approaches such as gamification and interactive e-books have been shown to enhance motivation for reading mathematics and improve conceptual understanding (Shao et al., 2025). These evidence-based interventions are crucial in the context of post-pandemic learning recovery to restore students' numeracy achievement in Indonesia and globally (Labrot & Defouw, 2024).

Based on the aforementioned issues, this study aims to address the following research questions: 1) How effective is the integration of mathematics reading activities in improving numeracy literacy among elementary school students under the National Curriculum compared to conventional mathematics instruction?; 2) What types of mathematics reading activities have been integrated into numeracy learning for elementary students in recent empirical studies?; 3) Which components of numeracy literacy (e.g., contextual understanding, data interpretation, problem-solving) are most positively impacted by the use of mathematics reading activities?; 4) What instructional strategies and classroom conditions support successful integration?

RESEARCH METHOD

This study adopts a Systematic Literature Review (SLR) approach combined with bibliometric analysis to assess existing literature, with the aim of uncovering trends, patterns, and key terms related to the Gasing Method. Utilizing the PRISMA framework, this approach ensures a systematic, comprehensive, and replicable review process, resulting in a clear and structured mapping of the research topic (Chotisarn & Phuthong, 2025).

The inclusion criteria for this study are: 1) The study includes only articles indexed in the Scopus database with a primary focus on the topics of "mathematics reading," "reading in mathematics," or "mathematical literacy"; 2) The selected document types are

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limited to peer-reviewed journal articles published between 2019 and 2024; 3) Articles must be written in either English or Indonesian; 4) Articles must contain empirical data, experimental findings, or conceptual reviews relevant to the study's objectives.

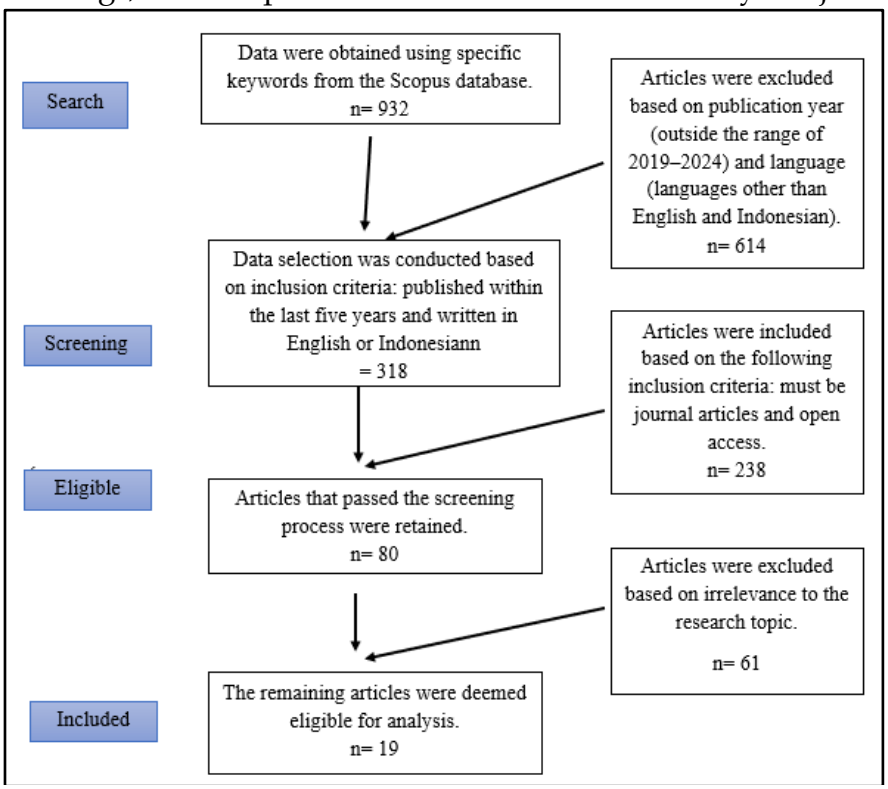

Figure 1. PRISMA Flow Diagram

The figure represents a PRISMA flow diagram illustrating the process of article search and selection from the Google Scholar and Scopus databases for the purpose of the Systematic Literature Review study. The Boolean keywords used were TITLE-ABS-KEY ("mathematics reading" OR "mathematical reading" OR "reading mathematics" OR "reading mathematical texts" OR ("reading strategies" AND mathematics) OR ("text comprehension" AND mathematics) OR ("mathematical literacy" AND reading)) AND PUBYEAR > 2019 AND PUBYEAR < 2026 AND (LIMIT-TO (DOCTYPE , "ar")) AND (LIMIT-TO (LANGUAGE , "English")) AND (LIMIT-TO (SUBJAREA , "SOCI") OR LIMIT-TO (SUBJAREA , "MATH")) AND (LIMIT-TO (OA , "all")).

The process began at the Search stage, where 932 articles were retrieved based on the specified keywords on the Scopus platform. At the Screening stage, 614 articles were excluded for not meeting the publication year range (i.e., outside 2019–2024) and language criteria (i.e., not written in Indonesian or English). This left 318 articles, which were then assessed based on the inclusion criteria, specifically that they were published within the last five years and written in either Indonesian or English. Of these 318 articles, 238 were further excluded for not meeting additional criteria namely, they had to be scholarly journal articles in Indonesian or English and open access. This stage resulted in 80 articles categorized as Eligible. From this number, 61 articles were excluded due to lack of relevance to the research topic, leaving 19 articles that met all criteria and were considered suitable for further analysis in the Included stage.

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RESULTS AND DISCUSSION

Results

Table 1. Articles Related to Mathematics Reading Activities

Nu	Author (Year)	Article Title	Research Design	Research Findings (Focus on Reading Mathematics)
1	Kesorn et al. (2020)	Development of an assessment tool for mathematical reading, analytical thinking and mathematical writing	Mixed methods study involving 222 fourth-grade students in Thailand; psychometric validation using the MRCML model.	Developed a valid and reliable assessment tool to measure mathematical reading and analytical thinking skills. Mathematics reading is viewed as the interpretation of problem texts and their transformation into mathematical symbols.
2	Zhu & Wu (2023)	A Study on Differential Effects of Mathematics Reading Ability on Students' Value-Added Mathematics Achievements	Longitudinal study involving 463 lower secondary school students, using a value-added model.	Demonstrated a strong positive correlation between mathematics reading ability and students' value-added progress in mathematics achievement. Mathematics reading ability influences the growth of mathematical performance.
3	Fang et al. (2023)	Beyond content: exploring the neglected dimensions of mathematics literacy	Qualitative study, case study of professional mathematicians.	Discussed how mathematics reading is multilateral, involving dynamic language, symbols, and visual representations. Mathematics reading is a complex and in-depth literacy practice.
4	van Graafeiland et al. (2023)	Discovering Learning Potential Using a Dynamic Screening Instrument	Experimental study involving 55 lower secondary students in the Netherlands, using dynamic testing.	The dynamic test included components of mathematics reading and cognitive abilities, showing a relationship between mathematics reading skills and learning potential; supports diagnostic evaluation.
5	Dammann et al. (2024)	Do connectives improve the level of understandability in mathematical reality-based tasks?	Experimental, quasi-experimental study involving 7th–10th grade students (n = 390), comparing two versions of problems with and without connectives.	Connectives significantly improved reading comprehension (on comprehension questions), especially among students with low language proficiency, but had no significant effect on mathematical problem-solving outcomes. Connectives support the stage of constructing a situation model in mathematical reading, but do not automatically make students better at solving the math problems.
6	Aguayo-Téllez & Martínez (2020)	Early school entrance and middle-run academic performance in Mexico	Quasi-experimental study using PISA 2018 data (15-year-old students, n ≈ 6,000), quantitative analysis.	Students who entered primary school earlier (before the age of 6) were more likely to repeat a grade and had lower PISA scores in mathematics, reading, and science (by approximately 6–10 points), indicating that early school entry has a negative impact on academic development, including mathematics and literacy.
7	Sonnenschein et al. (2022)	Elementary School Children's Home Learning Environments: Mathematics, Reading, Science, and Written Language	Quantitative survey of parents of elementary school students (n = 177).	Elementary students spent more time on reading activities at home than on mathematics and science. Parents perceived reading engagement as more important and felt more confident supporting reading than mathematics. A positive relationship between parental support and learning engagement was found primarily in reading and mathematics, highlighting the need for special attention to supporting children's mathematical literacy development.
8	Hardy & Clemens (2024)	Four Strategies for Supporting Students With Dyslexia in Solving Mathematics Word Problems	Literature review and instructional strategies for students with dyslexia.	Emphasized the strong connection between reading (reading literacy) and mathematical problem-solving; provided strategies such as adapting word problems, teaching schema-based problem types, explicit instruction of mathematical vocabulary, and encouraging students to develop their own problems to support those with difficulties in reading math problems, aiming to improve comprehension and the problem-solving process.

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Nu	Author (Year)	Article Title	Research Design	Research Findings (Focus on Reading Mathematics)
9	Rachmaningtyas et al. (2022)	Habituation of Mathematical Literacy Trained in Junior High School	Qualitative phenomenological study through interviews with lower secondary school teachers (n = 5).	Mathematical literacy was developed by engaging students in daily reading activities for 15–30 minutes, analyzing, and applying the content to real-world problems. Although challenges existed such as a lack of teacher awareness and the absence of specific assessment rubrics for mathematical literacy practice using tiered Higher Order Thinking Skills (HOTS) questions proved effective in enhancing students' mathematical literacy at the junior secondary level.
10	Tang, Lin & Kaur (2022)	Mapping and Extending the Theoretical Perspectives of Reading in Science and Mathematics Education Research	Conceptual study/theoretical analysis	This article outlines various theoretical perspectives on reading activities in mathematics education, ranging from reading comprehension and mathematical literacy to disciplinary literacy. Reading in mathematics is recognized as a multimodal skill (involving text, symbols, diagrams, etc.) that is subject-specific, highlighting the importance of reading mathematical materials for successful mathematics learning. The article emphasizes that mathematics reading is distinct from reading narrative texts, as mathematics instruction requires unique reading strategies and underscores the crucial role of teachers in facilitating these strategies.
11	Geng et al. (2024)	Learning behavioral patterns of students with varying performance in a high school mathematics course using an e-book system	Quantitative-descriptive study, lag sequential analysis, using 7-week e-book activity data from 80 Japanese high school students.	This study analyzed digital reading behavior (e-book) in mathematics lessons. It revealed different reading and learning strategies between students whose performance improved and those whose performance declined—students who improved tended to use deeper strategies (e.g., reading first, then highlighting), whereas those whose performance declined tended to use surface strategies (e.g., repeated marking or rereading only). Active mathematics reading including metacognitive and elaboration strategies was associated with better learning outcomes.
12	Aydin dkk. (2025)	Investigating the Predictive Performance of Process Data and Result Data in Complex Problem Solving Using the Conditional Gradient Boosting Algorithm	**Quantitative study, PISA 2012 data, machine learning analysis**	Main findings: Mathematical literacy scores from PISA results were the most dominant predictor of complex problem-solving ability, with reading literacy scores also showing a significant contribution. This indicates that engaging in mathematical reading (mathematical literacy) is highly relevant and plays a strong role in problem-solving skills, highlighting the importance of mathematical reading activities not only in literal questions but also in contextual and complex thinking processes.
13	Lavy & Shriki (2023)1	On Reading Mathematical Texts, Question-Asking and Cognitive Load	Quasi-experimental study, prospective mathematics teacher students, two groups (control vs. experimental)	Engaging in questioning while reading historical mathematical texts significantly reduced cognitive load compared to the control group. Questioning was found to be effective in enhancing understanding of mathematical texts that require higher-order thinking and metacognitive strategies. The study emphasizes that reading mathematical texts involves specific skills, and questioning can aid in the absorption of new information and reduce cognitive load.
14	Papadopoulos & Kyriakopoulou (2022)2	Reading Mathematical Texts as a Problem-Solving Activity: The Case of	Qualitative study with high school students, analysis of reading mathematical texts	The process of reading mathematical texts (particularly proofs) is identified as a problem-solving activity. Students who read mathematical proof texts went through all

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Nu	Author (Year)	Article Title	Research Design	Research Findings (Focus on Reading Mathematics)
		the Principle of Mathematical Induction	(mathematical induction texts)	stages of Polya's problem-solving process. Reading and understanding mathematical texts should be positioned as an active and strategic process that aligns with the characteristics of problem-solving learning. It is recommended that reading mathematical texts be taught as a specific skill.
15	Mubarokah & Amir (2024)3	Primary Students' Errors in Solving Mathematical Literacy Problems Based on Newman Analysis	Qualitative study with elementary school students, analysis of NEA (Newman Error Analysis) stages in solving mathematical literacy problems	Elementary school students exhibited all types of reading-to-calculating errors based on the NEA model from reading to the encoding stage. Comprehension errors in reading math problems were the most dominant. The study emphasizes the importance of numeracy instruction that focuses on understanding contextual problems to reduce errors in the reading and writing stages of mathematics.
16	Hamidi, Soleymani, Dazy, Meshkat (2024)1	Teaching Mathematics based on Integrating Reading Strategies and Working Memory in Elementary School	Quasi-eksperimen, pretest-posttest, 2 kelompok (eksperimen & kontrol), Quasi-experimental study, pretest-posttest design with two groups (experimental & control), 50 second-grade elementary students in Iran50 siswa kelas 2 SD, Iran	The integration of reading strategy instruction and working memory training significantly improved elementary students' ability to solve mathematical word problems. An explicit focus on close reading of mathematical texts served as an effective intervention to enhance students' problem-solving skills. Arithmetic skills (addition, subtraction) did not improve significantly without reading strategy training. The effectiveness was particularly evident in word problems, which demand comprehension of mathematical text. The study recommends similar training for elementary teachers so that reading in mathematics is treated as an integrated skill rather than merely a calculation process.
17	Rezat, Malik, Leifeld (2022)	Scaffolding Close Reading of Mathematical Text in Pre-service Primary Teacher Education at the Tertiary Level	Design research, evaluation of scaffolding and mathematical reading strategies among pre-service elementary school teachers in Germany (n=296)	The study developed and evaluated scaffolding materials (modules, videos, close-reading tasks) to support the ability to read mathematical texts, particularly in basic geometry. Survey results showed that some students found the close reading tasks helpful for understanding mathematical texts, although they struggled with the language and script presentation in the modules. Close reading tasks were seen as highly effective in helping students apply mathematical reading strategies (e.g., connecting theory to examples, generating their own explanations). The findings highlight the need to further develop mathematical reading scaffolding in elementary teacher education as essential preparation for teaching mathematical literacy in the future.
18	Maimun & Bahtiar (2023)3	Students' Learning Independence and Critical Thinking Ability Using Mobile Learning Technology	Quantitative, pretest-posttest, 83 junior high school students in Mataram	Although not specifically focused on mathematical reading, mobile-based learning integrated with mathematical literacy, reading, writing, and technology showed improvements in students' self-directed learning and critical thinking in mathematics. Some measured indicators touched upon mathematical literacy and learning activities involving mathematical reading, but the main focus was on fostering learner autonomy and critical thinking.
19	Pongsakdi, Kajamies, Veermans, dkk. (2020)1	What makes mathematical word problem solving challenging?	Quantitative; 891 fourth-grade students, Finland. IRT, cluster, and ANOVA analysis	Reading comprehension skills play a crucial role in solving both easy and difficult mathematical word problems. More challenging math problems require not only

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Nu	Author (Year)	Article Title	Research Design	Research Findings (Focus on Reading Mathematics)
		Exploring the roles of word problem characteristics, text comprehension, and arithmetic skills		arithmetic skills but also deep reading abilities. Students with low reading skills but high arithmetic skills only perform well on easier items; for difficult items, both skills are necessary. The difficulty of the items often lies not only in numerical complexity but also in the need to understand the meaning of the text and construct a situational model.

The systematic review of 19 scholarly articles revealed that the integration of mathematics reading activities has a significant and positive impact on the development of students' numeracy literacy, particularly at the elementary school level. Various studies show that mathematics reading activities not only serve as a means to understand problem texts but also function as a complex and strategic thinking process that connects language comprehension, mathematical symbols, and concept visualization.

For instance, the study by Kesorn et al. (2020) successfully developed a valid and reliable mathematics reading assessment tool, emphasizing that mathematics reading involves interpreting verbal sentences into mathematical representations. Meanwhile, a longitudinal study by Zhu & Wu (2023) demonstrated that mathematics reading ability directly contributes to long-term improvements in students' mathematics achievement. Additionally, Fang et al. (2023) argued that mathematics reading is a multidimensional literacy practice, involving comprehension of narrative, symbolic, and visual texts, making it far more complex than ordinary text reading.

Other studies, such as those by Hamidi et al. (2024) and Rezat et al. (2022), showed that integrating reading strategies into mathematics instruction, especially in the context of word problems, significantly improves students' problem-solving abilities. These findings imply that numeracy literacy is inseparable from reading activities, and that successful mathematics learning heavily depends on students' ability to understand and interpret information presented in mathematical texts.

Discussion

1. How effective is the integration of mathematics reading activities in improving numeracy literacy among elementary students under the National Curriculum compared to conventional mathematics instruction?

The integration of mathematics reading activities has been proven to be significantly more effective than conventional approaches that focus solely on computational procedures and formula memorization. Within the framework of the National Curriculum which emphasizes understanding, real-life contexts, and the strengthening of character and critical thinking skills mathematics reading activities show strong strategic alignment. Several studies reveal that conventional approaches often produce students who can perform calculations but fail to understand the problems or the context of word problems. Such teaching methods tend to separate language aspects from mathematics, whereas in reality, understanding math problems is closely linked to literacy skills.

For example, the study by Hamidi et al. (2024) found that students who were trained in reading strategies within mathematics instruction showed significant improvement in solving complex word problems. This suggests that mathematics reading is not merely about understanding the sentences in a problem but also about grasping the structure, purpose, and interrelated information within a mathematical context. Meanwhile,

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Pongsakdi et al. (2020) revealed that even students with strong arithmetic skills struggled with problems containing lengthy narratives or hidden information within the text. This indicates that arithmetic ability alone is not sufficient for successfully solving numeracy problems under the National Curriculum.

The effectiveness of reading integration is also evident in the enhancement of problem-solving skills, metacognitive abilities, and the reduction of cognitive load when students read mathematical problems, as shown in studies by Lavy & Shriki (2023) and Rezat et al. (2022). Therefore, it can be concluded that mathematics reading activities not only complement mathematics instruction but also serve as a fundamental element in fostering comprehensive and contextual numeracy literacy.

2. What types of mathematics reading activities have been integrated into numeracy learning for elementary students in recent empirical studies?

The variety of mathematics reading activities integrated into instruction is diverse, reflecting the multidimensional approach required to comprehend mathematical texts. One commonly used activity is close reading of mathematical texts, which goes beyond surface-level reading to analyze structure, symbols, technical terms, and the meaning behind the presented information. In the study by Rezat et al. (2022), this strategy was developed through modules and instructional videos that guided both students and pre-service teachers to read geometry texts deeply and strategically. Students were encouraged not only to read but also to annotate, formulate questions, and summarize using their own words.

Another frequently implemented activity is text-to-symbol transformation. In Kesorn et al. (2020), mathematics reading is conceptualized as the process of transforming narrative texts into symbolic or mathematical models. This is particularly important in word problems, where students must identify relevant data, recognize relationships between pieces of information, and express them as mathematical operations. Dammann et al. (2024) even investigated the impact of connectives (linking words) in word problems, finding that such linguistic elements significantly help students understand the structure of information especially for those with low language literacy skills.

In addition, metacognitive strategies such as questioning and summarizing while reading (Lavy & Shriki, 2023) and digital reading through interactive mathematics e-books (Geng et al., 2023) are also among the activities proven to improve mathematical reading skills. Rachmaningtyas et al. (2022) even combined daily reading habits with real-life context-based HOTS (Higher Order Thinking Skills) problems, demonstrating that regular reading practices can enhance students' sensitivity to mathematical situations in everyday life.

3. Which components of numeracy literacy are most positively impacted by the use of mathematics reading activities?

Based on the analysis of various articles, the components of numeracy literacy most positively impacted by mathematics reading activities are contextual understanding, problem situation modeling, and complex problem-solving. Students' ability to grasp the context of a problem is a key factor in solving word problems or real-life-based tasks, which are now a hallmark of questions under the National Curriculum. The study by Papadopoulos & Kyriakopoulou (2021) shows that reading mathematical texts (such as proofs in mathematical induction) is essentially a form of problem-solving in itself, as it requires comprehension, analysis, and interpretation.

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Another significantly improved component is data interpretation and mathematical visualization, especially when reading activities involve graphs, tables, or other visual representations, as seen in studies by Fang et al. (2023) and Tang et al. (2022). Students are trained to interpret symbols, graphs, and mathematical language as part of a coherent discourse, rather than as isolated elements. This is crucial, considering that one of the main challenges in current numeracy instruction is bridging the gap between mathematical language and everyday language.

Furthermore, students' ability to avoid initial misinterpretations also improves, as found in Mubarokah & Amir (2024), where many student errors occurred during the problem-reading stage. This indicates that numeracy instruction that does not emphasize comprehension during the reading phase risks creating misunderstanding from the very beginning of the problem-solving process. In other words, effective mathematics reading can prevent critical misinterpretations of the problem and its solution strategy.

4. What instructional strategies and classroom conditions support successful integration?

The successful integration of mathematics reading activities greatly depends on instructional strategies and classroom conditions that consistently and sustainably support this approach. One key strategy is the development of scaffolding, which provides gradual support in understanding mathematical texts. The study by Rezat et al. (2022) demonstrated that scaffolding in the form of modules, videos, and step-by-step exercises significantly helped prospective elementary school teachers understand basic geometry concepts through active reading. This can be adapted for elementary classrooms to enhance numeracy literacy from an early stage.

Another proven strategy is the training of metacognitive strategies, such as asking questions while reading, summarizing, or interpreting the meaning of symbols (Hardy & Clemens, 2024; Lavy & Shriki, 2023). This approach not only improves students' comprehension but also reduces the cognitive load that often hinders the processing of complex mathematical information. These activities also align with differentiated instruction under the National Curriculum, as they allow teachers to tailor strategies to the individual needs of students.

Supportive classroom conditions such as parental involvement (Sonnenschein et al., 2022), access to engaging mathematics reading materials, and a daily reading culture (Rachmaningtyas et al., 2022) also play a crucial role. Classrooms that encourage collaboration, discussion, and reflection on text-based math problems are more likely to foster numeracy literacy skills. Furthermore, the use of technology, such as e-books or mobile applications (Geng et al., 2023; Maimun & Bahtiar, 2023), offers flexible learning opportunities, especially in today's digitized educational environment.

Equally important is teacher competence. Without a clear understanding of the critical role of reading in mathematics instruction, the integration of such activities will be difficult to achieve. Therefore, professional development for teachers through text-based mathematics literacy training is a necessary step that requires greater attention.

One of the methods currently gaining traction in Indonesia is the GASING Method. GASING, which stands for *Gampang, Asyik, Menyenangkan* (Easy, Fun, and Enjoyable), is a mathematics learning approach developed by Professor Yohanes Surya. It introduces concepts concretely before transitioning to abstraction and mental arithmetic. According to Gasing Academy (2025), the method has been successfully implemented in training

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and dissemination programs across more than 110 cities and regencies in Indonesia. Through these initiatives, over 11,000 teachers and 13,700 students have gained an understanding of and benefited from the GASING Method. The GASING Method emphasizes:

a. A gradual transition from concrete to abstract understanding, followed by mental arithmetic (rapid mental calculations without any aids);
b. Intensive practice in reading numerical problems before engaging in fast calculations;
c. A significant improvement in basic numeracy skills and conceptual understanding for elementary and junior high school students.

These three components form a strong foundation to address the gaps and challenges previously discussed.

A quasi-experimental study by Mutiara et al. (2024) in Makassar demonstrated the method's significant effectiveness in enhancing numeracy skills among fourth-grade elementary students. The results showed improvement from the "Moderate" to the "Very High" category, with a t-score of 6.299, which exceeded the t-table value of 2.026 ($p < 0.05$). The core characteristics of the GASING Method include game-based learning with traditional games, intensive mental arithmetic training, and a student-centered approach with gradual scaffolding (Prahmana, 2015). The strength of GASING lies in its combination of concrete-manipulative elements and mental computation strategies, aligning well with the scaffolding needs of mathematical literacy in the National Curriculum. Moreover, it supports this study's findings regarding the importance of linguistic support and reading strategies in numeracy learning.

CONCLUSION

Based on the literature synthesis conducted, it can be concluded that the integration of reading activities into mathematics instruction contributes significantly to improving numeracy literacy among elementary school students. Mathematics reading activities not only enrich students' conceptual understanding of mathematical content but also foster critical thinking, problem-solving, and mathematical communication skills—all of which are competencies emphasized in the National Curriculum. The literature shows that approaches combining contextual texts, narratives, and explicit instruction in mathematics reading help students connect abstract concepts with their everyday experiences.

Furthermore, integrating mathematics reading supports the development of a classroom literacy culture, strengthens interdisciplinary connections, and facilitates the implementation of differentiated learning, as highlighted in the National Curriculum. This strategy has also been shown to increase students' confidence in tackling discourse- or narrative-based mathematics problems, which have long posed challenges in numeracy assessments.

However, the success of this approach is highly dependent on teachers' competence in designing meaningful reading activities, the availability of contextual learning resources, and a supportive learning environment that encourages collaboration and exploration. Therefore, teacher training and the development of integrated teaching materials are strategic steps to enhance numeracy literacy through mathematics reading activities in elementary schools.

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The teacher training conducted by Gasing Academy is expected to address this issue. Future research should evaluate the impact of this training to better understand the effectiveness of the GASING method. With such insights, it is hoped that appropriate modifications can be made to further enhance students' mathematics reading skills.

In summary, the integration of mathematics reading activities is not merely a pedagogical innovation, but a transformative solution aligned with the vision of the National Curriculum to develop students who are literate, critical thinkers, and capable of solving contextual problems.

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***RR. Selvi Amelia Rahmawati (Corresponding Author)**
Department of Education Faculty, UPI Bandung
Email: rselviameliarahmawati@upi.edu

Wahyu Sopandi
Department of Education Faculty, UPI Bandung
Email: wsopandi@upi.edu

Turmudi
Department of Education Faculty, UPI Bandung
Email: turmudi@upi.edu

Yohanes Surya
Department of Education Faculty, Surya Institut
Email: support@suryainstitute.org

Arie Rahmat Riyadi
Department of Education Faculty, UPI Bandung
Email: arie.riyadi@upi.edu