



Analysis of fifth-grade students' numeracy literacy skills in Mathematics

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ABSTRACT

The study's background highlights the low level of numeracy literacy among students in Indonesia, which limits their ability to perform calculations in everyday life. This study aims to examine the factors that influence numeracy literacy in Mathematics learning, particularly in fractions, and to analyze teachers' efforts to improve their skills. The research method is qualitative, with data collection techniques including observation, interviews, document review, and tests. The research participants included the principal, fifth-grade teachers, and fifth-grade students. The results indicated that students' literacy skills were in the moderate range, with indicators of communication and representation still requiring improvement. Numeracy skills were in the fairly good category, particularly in procedural aspects. However, difficulties remained in selecting strategies for solving fractions with different denominators. Teachers have made efforts to improve by using visual media, contextual questions, and group discussions, although limited resources and a narrow range of methods remain the primary obstacles. It can be concluded that students' literacy and numeracy skills have developed, but still require practice and innovation in learning strategies to support the achievement of the Kurikulum Merdeka competencies.

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ABSTRAK

Latar belakang penelitian menyoroti rendahnya kemampuan literasi numerasi murid di Indonesia sehingga memengaruhi praktik berhitung dalam kehidupan sehari-hari. Penelitian ini bertujuan untuk mengkaji faktor yang mempengaruhi kemampuan literasi numerasi pada pembelajaran Matematika, khususnya materi pecahan, serta menganalisis upaya guru dalam meningkatkan keterampilannya. Metode penelitian yang digunakan adalah kualitatif dengan teknik pengumpulan data melalui observasi, wawancara, dokumentasi, dan tes. Partisipan penelitian meliputi kepala sekolah, guru kelas V, dan murid kelas V. Hasil penelitian menunjukkan bahwa kemampuan literasi murid berada pada kategori sedang, dengan indikator komunikasi dan representasi masih memerlukan penguatan. Kemampuan numerasi berada pada kategori cukup baik, terutama pada aspek prosedural, namun masih ditemukan kesulitan pada pemilihan strategi penyelesaian soal pecahan berbeda penyebut. Guru telah melakukan upaya peningkatan melalui penggunaan media visual, soal kontekstual, serta diskusi kelompok, meskipun keterbatasan sarana dan variasi metode menjadi kendala utama. Dapat disimpulkan bahwa kemampuan literasi dan numerasi murid sudah berkembang namun masih memerlukan pembiasaan dan inovasi strategi pembelajaran agar dapat mendukung capaian kompetensi Kurikulum Merdeka.

Kata Kunci: kemampuan numerasi; literasi numerasi; pembelajaran Matematika

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INTRODUCTION

The ability to meet the demands of life in the Industry 4.0 era requires individuals to possess skills that are adaptive to ongoing societal and technological developments. One of the key competencies supporting such adaptability is literacy. Literacy has become a major priority in 21st-century education. In simple terms, literacy can be defined as the ability to read and write, whether in the form of letters, symbols, or numbers, encompassing the capacity to understand ideas or the underlying meaning of a given issue (Narayani, 2019). The World Economic Forum (WEF) identified six fundamental literacy domains in 2015: reading and writing literacy, numeracy literacy, scientific literacy, digital literacy, financial literacy, and cultural and civic literacy (Nugraha & Octavianah, 2020). Literacy is inseparable from human life, as it is required to fulfill various aspects of daily living, including numeracy literacy.

Numeracy literacy, which is learned through mathematics, contributes to everyday life practices, both in career contexts and in Home and Consumer Studies (HCS). Therefore, more realistic contextual scenarios are needed for students to engage with, particularly those derived from real-life situations (Agustira & Rahmi, 2022). Mathematics instruction at the elementary school level should adopt activity-based approaches, such as learning through play. Teachers who diagnose students' needs, design instruction, provide motivation, present contextual problems, and demonstrate problem-solving strategies can foster students' mathematical problem-solving abilities (Navida et al., 2023). Numeracy-oriented learning critically involves attention to relationships within mathematics and the exploration of problems, thereby making mathematics learning a more empowering experience (Setiani et al., 2023).

Numeracy literacy encompasses the ability to apply mathematical concepts and principles in real-life situations. Possessing mathematical ability alone does not necessarily indicate that an individual has numeracy competence. Previous studies have shown that students still experience difficulties in writing mathematical symbols and understanding fractions (Buyung et al., 2022; Rezky et al., 2022). In line with these findings, preliminary observations indicate that fifth-grade students continue to face various challenges in mathematics learning, particularly in the domain of numeracy literacy. Unlike prior studies, this research also examines teachers' efforts to address learning barriers. Therefore, this study aims to investigate the factors influencing students' numeracy literacy and to analyze the roles of school principals and teachers in optimizing these abilities through mathematics instruction.

LITERATURE REVIEW

Numeracy Literacy Ability

Numeracy literacy refers to the knowledge and skills to: (1) use various types of numbers and symbols related to basic mathematics to solve practical problems in diverse everyday contexts; (2) analyze information presented in various forms, such as graphs, tables, charts, and others; and (3) utilize the interpretation of such analyses to make predictions and draw conclusions and decisions (Mahara & Hasbi, 2018). In simple terms, numeracy literacy can

be defined as the ability to apply numerical concepts and arithmetic operation skills in everyday life. It also encompasses the ability to interpret quantitative information found in one's surroundings. In short, numeracy literacy is the competence to develop and confidently apply mathematical knowledge and skills across all aspects of life.

Numeracy literacy encompasses knowledge, skills, behaviors, and positive dispositions (Sari & Hasanudin, 2023). Numeracy literacy ability refers to the capacity to work with numbers, such as performing calculations. It also involves the ability to use numbers for computation, apply mathematical concepts, and understand ideas expressed through numerical representations. Furthermore, numeracy literacy reflects intellectual competence in using numbers and logical reasoning, including abilities in mathematics, classifying and categorizing information, and thinking in abstract concepts to identify relationships among different elements. In essence, numeracy literacy is an individual's ability to use numbers, perform calculations, and transform quantitative information into meaningful interpretations.

Narrative or word-based problems can be transformed into numerical representations, which can then be solved using mathematical calculations. Mathematical-logical intelligence (numeracy literacy ability) refers to the capacity to deal with numbers and computations, patterns, and logical and scientific thinking. This intelligence includes the ability to process numbers, perform mathematical operations, and engage with other numerical-related tasks (Siagian, 2017). Numeracy literacy can therefore be understood as an individual's ability to analyze information and solve everyday problems through the practical application of mathematical calculations. Meanwhile, numeracy itself can be defined as the ability to apply numerical concepts along with arithmetic operation skills in solving existing problems (Wirnoto & Ratnaningsih, 2022).

Objectives and Benefits of Numeracy Literacy

The objectives of numeracy literacy include the following:

1. Sharpen and strengthen students' numeracy knowledge and skills in interpreting numbers, data, tables, graphs, and diagrams.
2. Apply knowledge and numeracy literacy skills to solve problems and make decisions in daily life based on logical considerations.
3. Forming and strengthening Indonesian human resources who are capable of managing the wealth of natural resources so that they can compete and collaborate with other nations for the prosperity and welfare of the nation and state.

The benefits of studying numeracy literacy for students are as follows.

1. Students have the knowledge and skills to plan and manage activities well.
2. Students can perform calculations and interpretations of data found in everyday life.
3. Students can make the right decisions in every aspect of their lives.

Mathematics Learning in Elementary School

Mathematics serves as a tool for developing ways of thinking; therefore, it is essential not only for solving problems in everyday life but also for supporting the advancement of science and technology. This implies that learning mathematics aims to prepare students to apply mathematical ways of thinking in their daily lives as well as in learning other disciplines. Mathematics is a universal science that underpins the development of modern technology, plays a significant role across various fields, and enhances human reasoning. Meanwhile, learning is defined as a deliberate effort that involves and utilizes teachers' professional knowledge to enable learners to achieve curriculum objectives (Wirnoto & Ratnaningsih, 2022). Learning is considered effective when its objectives are achieved as planned. Mathematics learning, therefore, aims to develop logical thinking skills rather than merely computational proficiency.

Calculations can be performed using tools such as calculators and computers; however, problem-solving requires logical thinking and analytical skills. Therefore, in learning mathematics, students must develop an accurate and comprehensive understanding in accordance with appropriate learning stages, through engaging methods and media while adhering to mathematical principles (Oktaviani & Dewi, 2019). Mathematics learning in elementary school is a fundamental area of study that should be provided to all students from an early stage to equip them with computational and data-processing skills. These competencies are essential for enabling students to acquire, manage, and utilize information in order to adapt to dynamic, uncertain, and competitive environments. Furthermore, mathematics learning serves as a means for problem-solving and for communicating ideas or concepts through symbols, tables, diagrams, and other forms of representation.

Factors Influencing Literacy Ability

Numeracy literacy ability refers to students' capacity to solve problems involving numerical sequences by identifying and following specific patterns or ordered series (Nurtiana, 2023). This ability supports students in examining and analyzing number sequences to determine their order. The ability to operate with numbers refers to students' competence in performing arithmetic operations, including addition, subtraction, multiplication, and division. However, literacy ability at the elementary school level faces various challenges that affect its effectiveness. One of the primary obstacles is the lack of parental support. Some parents pay insufficient attention to the importance of literacy learning, resulting in minimal participation in supporting literacy activities at home.

METHODS

This study employs a descriptive qualitative method to examine the numeracy literacy abilities of fifth-grade students in mathematics. This method does not involve any specific treatment or intervention; rather, it focuses on describing phenomena as they naturally occur. The research was conducted at SDN Balekambang 03 Pagi. Data were collected through observations of students' learning activities, in-depth interviews with teachers and

students, and document analysis of students' work and instructional records. Data analysis was carried out using an interactive model that included data reduction, data display, and conclusion drawing.

RESULTS AND DISCUSSION

Factors Influencing Numeracy Literacy Ability

Based on the results of observations on the numeracy literacy abilities of fifth-grade students in mathematics at SDN Balekambang 03 Pagi, students experience various difficulties in mathematics learning. They encounter challenges in reading and interpreting statistical data and basic mathematical symbols, including difficulties in understanding graphs, tables, and other mathematical representations. Students are also not yet optimal in applying the mathematical concepts they have learned to everyday life. Therefore, efforts to enhance numeracy literacy within mathematics instruction are necessary. This issue is unsurprising, as mathematics is often perceived as abstract, thus requiring innovative approaches that can support students in improving their numeracy literacy (Sintawati et al., 2020).

The observational findings also indicate that students experience difficulties in understanding fraction concepts with different denominators and often rely on memorizing procedural steps without fully comprehending the underlying meaning. Barriers are evident when students are asked to interpret graphs, tables, or basic mathematical symbols, as many still struggle to connect the presented information with relevant mathematical concepts. In geometry learning, students frequently hesitate when asked to measure and explain the results of their calculations; some even choose to remain silent due to a lack of confidence in their answers. Moreover, in the context of word problems, many students are not yet able to relate real-life situations to appropriate mathematical operations.

In addition, the observational findings reveal that several factors, including family background, learning motivation, availability of learning resources, and support from the school environment, influence students' numeracy literacy abilities. Students who are accustomed to reading, engaging in discussions, and practicing word problems at home demonstrate a better understanding of how to connect textual information with mathematical symbols. In contrast, students with limited access to learning materials struggle to comprehend contextual problems. Motivation also plays a significant role, as students with a strong interest in mathematics tend to exhibit better reasoning and are more capable of applying numeracy skills across various situations. Furthermore, support from the school environment, including both teachers and school principals, serves as a determining factor in optimizing students' literacy and numeracy abilities.

Difficulties in learning numeracy literacy can be addressed through instructional strategies that are more contextual, interactive, and oriented toward diverse mathematical representations. In strengthening students' numeracy competencies, it is necessary to increase activities that are rich in numeracy content. Strategies for developing numeracy literacy can begin at the classroom level, both through mathematics and non-mathematics learning activities (Hadi et al., 2023). At the school level, literacy initiatives can be enhanced by developing a numeracy-rich physical environment, implementing targeted interventions

for at-risk students, and involving parents in numeracy activities. Beyond the classroom and school levels, the development of numeracy literacy should also be supported at the regional level through training programs for teachers, supervisors, and school principals.

Teachers' limited understanding and skills in integrating numeracy literacy into instruction constitute a significant barrier to effective numeracy literacy learning. Many teachers do not yet fully comprehend the importance of numeracy literacy or how to implement it in everyday teaching practices. As a result, mathematics instruction tends to focus primarily on numerical computation, with insufficient emphasis on students' ability to analyze and integrate concepts within learning. This condition hinders efforts to develop literacy competencies in a holistic manner. To address this issue, it is necessary to enhance teachers' understanding of numeracy literacy through training programs and workshops that focus on developing numeracy literacy competencies. Therefore, through well-implemented numeracy literacy in mathematics learning, students can develop critical thinking, problem-solving skills, and the ability to explore their surrounding environment.

The Role of School Principals and Teachers in Enhancing Numeracy Literacy Ability

Based on the interview findings, the school principal plays a crucial role in establishing policies and a school climate that supports the improvement of students' literacy and numeracy abilities. The principal provides support through the provision of learning facilities, the procurement of supplementary books, and encouragement for teachers to implement literacy- and numeracy-based instructional strategies. In addition, the principal conducts regular monitoring of the mathematics learning process, thereby motivating teachers to integrate literacy activities, such as reading word problems, and numeracy practices through the application of numerical concepts in everyday life. With active leadership from the principal, the learning environment becomes more conducive and oriented toward strengthening students' fundamental competencies. Likewise, teachers also play an essential role in improving students' numeracy literacy abilities.

Based on the interview findings, teachers play a direct role as facilitators in developing students' literacy and numeracy abilities. Furthermore, teachers strive to implement contextual learning strategies, such as providing word problems related to everyday life, exercises involving price comparisons in the school canteen, and activities that involve distributing concrete objects, such as cakes or classroom materials. Through these methods, students not only learn to perform arithmetic operations but also gain a deeper understanding of numerical meaning and the relationships among mathematical concepts. Teachers also guide students in reading, interpreting, and rewriting mathematical information, thereby fostering balanced development of their numeracy literacy. These findings indicate that teachers' creativity in selecting instructional methods and media significantly influences the improvement of students' literacy and numeracy abilities.

Discussion

The findings of this study indicate that most students tend to memorize formulas without deeply understanding the underlying concepts. This condition aligns with the cognitive development characteristics of elementary school students, who require concrete

experiences. Students' understanding of mathematical concepts is more effectively developed when presented through real-life contexts (Saputra et al., 2025). Furthermore, mathematics learning based on concrete experiences can foster students' critical thinking and analytical skills (Mertayasa et al., 2024). The study also found that some students remain passive during the learning process, merely waiting for the teacher's explanation without attempting to explore concepts independently. This phenomenon is consistent with findings suggesting that competency-based learning requires the integration of knowledge, skills, and attitudes; therefore, it is insufficient for students to act solely as passive recipients of information (Patmaningrum, 2020).

Low levels of student engagement in mathematics learning often hinder the internalization of numeracy literacy, as numeracy instruction should be critical in nature and empower students to explore relationships among concepts (Riska et al., 2021). On the other hand, some students prefer learning through repeated practice of exercises. While this approach supports procedural skills, it does not fully develop problem-solving abilities. The use of contextual problems can help students connect theoretical knowledge with real-life applications (Simamora & Tilaar, 2021). In terms of mathematical ability, high-achieving students tend to produce correct responses across numeracy literacy indicators in mathematics. Group discussion is one of the learning strategies students choose to better understand the material. This form of collaboration allows them to exchange ideas and deepen their understanding. Group-based learning models have been shown to be effective in improving the numeracy literacy of fifth-grade students (Dewi, 2023).

In addition, learning strategies and motivation have been shown to be important factors influencing how students learn mathematics. Interest and motivation in learning mathematics are correlated with students' learning outcomes (Buyung et al., 2022). Research based on sustained numeracy literacy practices is expected to strengthen students' reasoning in understanding relationships among mathematical concepts (Perdana & Suswandari, 2021). Meanwhile, Pratiwi et al. (2020) explain that intrinsic motivation can encourage students to be more persistent in understanding abstract mathematical concepts. Environmental factors also influence students' learning approaches, including parental support and the availability of learning resources at home. A supportive learning environment enriches students' experiences in solving mathematical problems (Almita et al., 2024). Support from family, school, and the community plays a crucial role in shaping the development of students' numeracy literacy (Fauziyah et al., 2024).

The findings indicate that fifth-grade students employ diverse approaches to learning mathematics, ranging from memorizing formulas and repeating practice exercises to group discussions and independent exploration, and that these approaches are supported by motivation and environmental factors. This variation is consistent with theories suggesting that learning success is influenced by the interaction between internal and external factors (Ayuningtyas & Sukriyah, 2020). Furthermore, numeracy literacy indicators can be achieved when students are guided through appropriate learning strategies that incorporate critical thinking, collaboration, and communication, enabling them to become more engaged and active, and facilitating the effective development of numeracy literacy (Feriyanto, 2022). Numeracy skills tend to develop more effectively when students are involved in collaborative, unstructured problem-solving activities (Narayani, 2019). In addition, students' ability to

apply literacy and numeracy in mathematics is reflected in their proficiency in formulating, using, and interpreting mathematical representations within real-life contexts.

Numeracy literacy is not merely a computational skill, but also encompasses the ability to reason, model, and interpret real-world problems mathematically. Mathematics learning involves reading mathematical texts, engaging in discussions using appropriate technical terminology, and writing justifications, all of which are essential in helping both students and prospective teachers integrate literacy practices into the mathematics learning process (Feriyanto, 2022). This study indicates that students' numeracy literacy varies, particularly in their ability to relate mathematical concepts to everyday life. Some students are able to connect fractions to activities such as sharing food or calculating shopping discounts, while others still experience difficulties. Therefore, numeracy instruction should be grounded in realistic contexts to enhance meaningful learning. Numeracy literacy develops optimally when students are engaged with real-world problems. The integration of numeracy literacy into elementary mathematics learning can improve conceptual understanding as well as its application in everyday life (Riska et al., 2021).

Furthermore, this study found that students can explain the use of fractions in real-life contexts, such as dividing a cake or comparing prices in the school canteen. These findings indicate the presence of applied understanding, though it is not yet fully developed across all students. Meanwhile, numeracy literacy indicators include the ability to analyze information and relate it to mathematical symbols; students who are well-trained in numeracy can use their analyses to make everyday decisions. However, students' ability to represent mathematical concepts in various forms, such as graphs, tables, and visual diagrams, remains a challenge. The findings show that some students can illustrate fractions using partitioned circles but experience difficulties when required to express them in symbolic notation. Numeracy ability encompasses not only computation but also consistent mathematical representation, as numeracy indicators require the skill to transform quantitative data into various forms of representation (Fajriyah, 2022).

Students' ability to explain problem-solving strategies is also an important indicator of numeracy literacy. Based on the interview findings, students can identify logical steps, such as finding a common denominator before adding fractions, although some still demonstrate inconsistency. Furthermore, effective numeracy literacy-based instruction should emphasize logical reasoning and mathematical argumentation rather than merely focusing on final answers. In practice, some students exhibit flexibility by attempting various strategies, such as using visual representations or performing direct calculations. This reflects a degree of adaptability in numeracy, although students' preferences may vary. Numeracy literacy encompasses the use of multiple approaches to solve unstructured problems, highlighting the importance of visual context as a bridge toward symbolic understanding (Sari & Hasanudin, 2023). Problem-based learning models can enhance students' ability to select the most appropriate problem-solving strategies (Dewi et al., 2024; Susanti et al., 2024).

Overall, this study indicates that students' ability to apply literacy and numeracy in elementary school still requires further improvement. Students have begun to demonstrate the ability to relate concepts to everyday life, use simple representations, and explain solution strategies; however, they remain limited in their symbolic consistency and in generalizing strategies. Furthermore, the strengthening of numeracy literacy should be

carried out systematically through experience-based approaches, as numeracy literacy can be enhanced through metacognitive training that fosters awareness. In line with this, the study also highlights the important roles of school principals and teachers in improving students' numeracy literacy. One of the principal's roles is to provide motivation and support to teachers. Moreover, teachers contribute by implementing instructional approaches that align with students' interests and needs. This underscores the critical role of teachers in providing authentic contexts to support the development of students' numeracy literacy (Buyung et al., 2022).

CONCLUSION

The findings of this study indicate that students' ability to apply literacy and numeracy is not yet evenly developed. Some students can relate mathematical concepts, particularly fractions, to everyday experiences, such as sharing food or calculating prices at the school canteen. However, other students remain limited to memorizing formulas and struggle to connect concepts to real-life situations. In the learning process, students are generally able to solve routine problems but encounter challenges when faced with contextual problems that require representation in the form of graphs, tables, or mathematical symbols. Overall, students' literacy and numeracy skills still need improvement through instructional strategies that emphasize real-life contexts, diverse mathematical representations, and the strengthening of critical thinking skills. Teachers play a crucial role in facilitating meaningful learning by providing contextual problems, guiding students in selecting appropriate problem-solving strategies, and fostering learning motivation. This study highlights the importance of strengthening literacy and numeracy as essential 21st-century skills that support students' academic success. Future research may focus on developing instructional models to enhance numeracy literacy among elementary school students.

AUTHOR'S NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. They also affirm that this article is free from plagiarism.

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