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AN ANALYSIS OF GAPS IN ELEMENTARY SCHOOL STUDENTS' MATHEMATICAL LITERACY IN SOLVING CONTEXTUAL PROBLEMS

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Abstract *This study aims to analyze the gaps in elementary school students' mathematical literacy when solving contextual problems. Mathematical literacy is understood as students' ability to formulate, apply, and interpret mathematics in various real-life contexts. However, learning practices in elementary schools are often still dominated by procedural and textbook-oriented approaches, resulting in a gap between expected competencies and students' actual abilities. This study employed a qualitative descriptive approach with a case study design. Data were collected through contextual mathematical literacy tests, analysis of students' written work, classroom observations, and semi-structured interviews with students and teachers. The results indicate that the most prominent gaps occur in (1) understanding contextual situations, (2) translating contexts into mathematical representations, (3) selecting appropriate problem-solving strategies, and (4) interpreting mathematical solutions back into real-life contexts. These gaps are influenced by limited exposure to contextual problems, teachers' focus on procedural mastery, and students' low confidence in reasoning and argumentation. The findings suggest that systematic efforts are needed to integrate contextual and meaningful learning into elementary mathematics instruction to strengthen students' mathematical literacy.*

Keyword: *Mathematical Literacy, Elementary School, Contextual Problems, Learning Gap*

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Abstrak Penelitian ini bertujuan untuk menganalisis kesenjangan literasi matematika siswa sekolah dasar dalam menyelesaikan masalah kontekstual. Literasi matematika dipahami sebagai kemampuan siswa untuk merumuskan, menerapkan, dan menafsirkan matematika dalam berbagai konteks kehidupan nyata. Namun, praktik pembelajaran matematika di sekolah dasar masih cenderung berorientasi pada prosedur dan buku teks, sehingga menimbulkan kesenjangan antara kompetensi yang diharapkan dan kemampuan aktual siswa. Penelitian ini menggunakan pendekatan kualitatif deskriptif dengan desain studi kasus. Data dikumpulkan melalui tes literasi matematika berbasis konteks, analisis jawaban tertulis siswa, observasi pembelajaran, serta wawancara semi-terstruktur dengan siswa dan guru. Hasil penelitian menunjukkan bahwa kesenjangan literasi matematika paling menonjol terjadi pada aspek pemahaman konteks masalah, kemampuan merepresentasikan konteks ke dalam model matematika, pemilihan strategi penyelesaian, serta penafsiran hasil matematika kembali ke konteks nyata. Kesenjangan tersebut dipengaruhi oleh terbatasnya paparan siswa terhadap masalah kontekstual, dominasi pembelajaran prosedural, serta rendahnya kepercayaan diri siswa dalam bernalar dan berargumentasi. Temuan ini menegaskan perlunya penguatan pembelajaran matematika kontekstual dan bermakna di sekolah dasar untuk meningkatkan literasi matematika siswa.

Kata Kunci: *Literasi Matematika, Sekolah Dasar, Kontekstual, Kesenjangan Pembelajaran*

A. INTRODUCTION

Reading is a fundamental skill that must be mastered by children to enable them to access knowledge and information and to function effectively in everyday life. Numerous studies have emphasized that reading should be introduced from an early age in learning, as it serves as a key to acquiring knowledge and provides access to understanding all subject areas (Arif et al., 2021; Alneyadi et al., 2023; Arianto et al., 2024).

Mathematical literacy is one of the key competencies required for students to face the challenges of the twenty-first century, particularly in societies increasingly characterized by complex social, economic, and environmental issues. Mathematical literacy goes beyond computational skills and encompasses the ability to understand contextual problems, apply appropriate mathematical concepts and procedures, and interpret and communicate solutions in various real-life situations (OECD, 2019; OECD,

2023). In elementary education, mathematical literacy serves as a crucial foundation for developing students' logical, critical, and systematic thinking skills from an early age.

Results from the *Programme for International Student Assessment* (PISA) consistently indicate that Indonesian students' mathematical literacy remains at a basic level, particularly in understanding contextual problems, reasoning, and mathematical modeling (OECD, 2019, 2023). This condition suggests that students still experience difficulties in connecting mathematical concepts with real-life situations. These findings are further supported by national studies reporting that elementary school students tend to perform well on routine problems but encounter significant challenges when solving non-routine and contextual problems that require deeper interpretation and reasoning (Putri & Zulkardi, 2020; Suryadi et al., 2021).

Contextual problems should function as a strategic means to develop mathematical literacy because they enable students to construct meaning by linking mathematical concepts to real-life experiences. Context-oriented instructional approaches, such as Realistic Mathematics Education (RME), have been shown to enhance conceptual understanding, modeling abilities, and mathematical reasoning (Gravemeijer et al., 2017; Laurens et al., 2018; Wijaya, 2018). However, in elementary mathematics classrooms, contextual problems are often treated merely as word problems that emphasize final answers, with limited attention to contextual meaning and students' mathematical thinking processes.

Several studies indicate that elementary mathematics instruction remains dominated by procedural and textbook-centered approaches. Teachers tend to prioritize accuracy of procedures and final results rather than students' reasoning processes, representations, and solution reflections (Nurjanah et al., 2020; Rahmawati & Prabawanto, 2022). Consequently, students become accustomed to memorizing solution steps without understanding the relationship between mathematical concepts and real-life situations, potentially widening the gap between literacy-oriented learning objectives and students' actual competencies.

In addition to instructional factors, mathematical disposition and reading literacy also contribute to students' low mathematical literacy. Research has shown that difficulties in understanding problem texts and low mathematical disposition directly affect students' failure in solving contextual problems (Mukhlesiyeni, 2024; Marisa et al., 2023). This highlights that mathematical literacy is multidimensional and influenced by interactions among cognitive abilities, affective factors, and learning experiences.

Based on these considerations, a comprehensive investigation is required to map and analyze the gaps in elementary school students' mathematical literacy in solving contextual problems. Such gap analysis is essential for identifying critical weaknesses and underlying factors as a basis for designing more contextual, meaningful, and literacy-oriented mathematics instruction. Therefore, this study focuses on analyzing gaps in elementary school students' mathematical literacy in solving contextual problems.

B. METHOD

This study employed a qualitative descriptive approach with a case study design. A qualitative approach was selected because the research aimed to gain an in-depth understanding of students' thinking processes and the forms of mathematical literacy gaps that emerge when solving contextual problems, rather than to test hypotheses or measure the effects of specific treatments (Creswell & Poth, 2018; Miles et al., 2014). The case study design enabled an in-depth and holistic exploration of the phenomenon within a particular educational context.

The research participants consisted of fifth-grade elementary school students selected through purposive sampling. This sampling technique was applied based on the consideration that students at this level have already learned fundamental mathematical concepts relevant to contextual problem solving and are capable of articulating their thinking processes both verbally and in writing (Sugiyono, 2019).

Data were collected using several techniques: (1) contextual mathematical literacy tests, (2) document analysis of students' written responses, (3) classroom observations

of mathematics instruction, and (4) semi-structured interviews with students and teachers. The use of multiple data collection methods aimed to obtain a comprehensive understanding of students' mathematical literacy gaps and to enhance the credibility of the findings through methodological triangulation (Creswell & Poth, 2018; Miles et al., 2014).

The test instruments were developed based on the PISA mathematical literacy framework, which includes the abilities to formulate contexts mathematically (*formulating*), apply mathematical concepts and procedures (*employing*), and interpret and evaluate solutions (*interpreting*) (OECD, 2019, 2023). Interview instruments were used to further explore students' reasons for selecting particular problem-solving strategies and the difficulties they experienced during the problem-solving process.

Data analysis was conducted through iterative stages of data reduction, data display, and conclusion drawing. This analytical procedure followed the interactive qualitative data analysis model proposed by Miles, Huberman, and Saldaña (2014). Data trustworthiness was ensured through source and technique triangulation, as well as repeated verification of interpretations to maintain consistency and accuracy of the findings.

C. RESULT AND DISCUSSION

1. Gaps in Understanding Contextual Problems

The analysis revealed that most students experienced difficulties in understanding the information embedded in contextual problems. Students tended to read problems partially and immediately identify keywords associated with specific arithmetic operations without first comprehending the situation as a whole. This was evident in students' responses, which directly presented mathematical operations without explanations of the contextual meaning.

These findings indicate that students are not accustomed to engaging in the *understanding the problem* phase as an initial step in problem solving. Failure to comprehend the context led students to misinterpret relevant information and overlook

relationships among data presented in the problem. This pattern aligns with findings from PISA-based contextual task studies, which show that errors frequently originate at the stage of situational understanding and identification of relevant information (Kolar & Hodnik, 2021; Wijaya et al., 2014). Within the mathematical literacy framework, this issue reflects a gap in the *formulating* process—namely, the ability to translate real-world situations into solvable mathematical problems (OECD, 2019; OECD, 2023).

2. Gaps in Mathematical Representation

Another prominent gap was observed in students' ability to represent contextual problems mathematically. Most students struggled to identify variables, select appropriate representations (tables, diagrams, or symbolic models), and connect contextual information with relevant mathematical concepts. Analysis of students' written work showed that many applied calculations directly without constructing sketches, tables, or mathematical statements representing relationships among quantities.

This finding supports studies on modeling difficulties in contextual problems, which emphasize representation as a critical "bridge" between context and mathematical procedures; when this bridge is weak, errors tend to propagate to subsequent solution stages (Kolar & Hodnik, 2021; Rusdiana et al., 2023). Furthermore, limited exposure to PISA-like problems and context-based tasks in textbooks has been reported as a contributing factor to students' weak representational skills (Effendi et al., 2019; Sulistiani & Zulkardi, 2019).

3. Gaps in Problem-Solving Strategies

At the problem-solving stage, students generally relied on mechanical strategies and followed solution examples previously provided by teachers. Trial-and-error approaches or direct application of formulas without clear reasoning were prevalent. Students rarely reflected on their chosen strategies or considered alternative solutions more appropriate to the context.

These results indicate limited strategic flexibility in solving contextual problems. From a mathematical literacy perspective, students appeared stronger in applying procedures than in reasoning and selecting strategies suited to the context (OECD, 2019; OECD, 2023). Studies on literacy-oriented instructional materials suggest that regular exposure to varied contextual tasks accompanied by strategy-focused discussions enhances students' strategic selection and argumentation skills (Amir et al., 2023; Putri Hapsari et al., 2022). This reinforces the assumption that observed strategy gaps are influenced not only by individual ability but also by task exposure and instructional design.

4. Gaps in Interpreting Results

Gaps were also evident in students' ability to interpret results. Many students failed to relate numerical outcomes back to the given context. Their answers often ended with numerical values without explaining their meaning or appropriateness within the real-life situation.

This inability to interpret results suggests that students do not yet perceive mathematics as a tool for understanding and decision-making in everyday contexts. In mathematical literacy studies, result interpretation requires students to assess solution plausibility, interpret units or measures, and reconnect solutions to the original context (OECD, 2019; Vos, 2018). These findings are consistent with empirical evidence indicating that students often omit interpretation and reflection stages due to instructional emphasis on final answers rather than justification and evaluation (Kolar & Hodnik, 2021; Yeni, et. al., 2020).

CONCLUSION

This study concludes that gaps in elementary school students' mathematical literacy in solving contextual problems occur across nearly all stages of mathematical literacy, from understanding context to interpreting results. These gaps are influenced by instructional practices that place limited emphasis on contextual meaning and students' thinking processes. Therefore, systematic efforts are required to integrate contextual and meaningful problem-solving activities into elementary mathematics instruction in order to strengthen students' mathematical literacy.

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