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Numeracy Ability as a Predictor of Elementary School Students' Reflective Thinking in Mathematics Learning

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ABSTRACT

Purpose – This study aims to examine the relationship between numeracy ability and reflective thinking among elementary school students in mathematics learning. Numeracy ability includes understanding number concepts, interpreting quantitative information, and applying mathematics in everyday contexts. Reflective thinking is a higher-order thinking skill that involves understanding the problem, evaluating strategies, drawing conclusions, and reflecting on the outcomes of problem-solving.

Methodology – A quantitative correlational design was employed involving 134 fourth- and fifth-grade students in Kartoharjo District, Madiun City, selected through purposive sampling. Data were collected using validated and reliable numeracy and reflective thinking tests. The data were analyzed using normality and linearity tests, followed by the Pearson Product-Moment correlation test.

Findings – The data met the assumptions of normality (numeracy: $p = 0.087$; reflective thinking: $p = 0.092$) and linearity (deviation from linearity: $p = 0.214$). Pearson correlation analysis revealed a positive and significant relationship between numeracy ability and reflective thinking ($r = 0.623$, $p < 0.001$), indicating that students with higher numeracy ability tend to demonstrate stronger reflective thinking skills.

Significance – This study contributes empirical evidence regarding the relationship between numeracy ability and reflective thinking among elementary school students, an area that has received limited attention in elementary mathematics education. The findings provide practical implications for designing numeracy-oriented mathematics instruction to foster higher-order thinking skills.

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INTRODUCTION

Mathematics learning in elementary school plays an important role in developing students' systematic, logical, and critical thinking. One of the essential competencies in mathematics education is numeracy ability. Numeracy refers to the ability to use mathematical concepts, procedures, facts, and tools to interpret quantitative information and solve problems in real-life contexts (Andriatna et al., 2024; Faragher, 2023; Goos et al., 2020; OECD, 2019). Thus, numeracy extends beyond computational skills to include the interpretation and application of mathematical knowledge in meaningful situations. Strong numeracy is also associated with conceptual understanding, procedural fluency, and mathematical problem solving (Kilpatrick et al., 2002; Sakurai & Goos, 2023).

In this study, numeracy ability is assessed through four indicators: (1) understanding numbers, including recognizing, comparing, and representing numbers; (2) performing mathematical operations, including addition, subtraction, multiplication, and division; (3) interpreting data presented in tables, graphs, or diagrams; and (4) applying mathematical concepts to solve contextual problems. These aspects indicate that numeracy involves not only procedural calculation but also the interpretation and application of mathematical knowledge. Accordingly, students with stronger numeracy skills are expected to have a greater capacity to analyze mathematical situations and solve problems effectively (Adelia et al., 2024a; Faragher, 2023; Kilpatrick et al., 2002; Yustitia & Siswono, 2023).

Reflective thinking is a higher-order cognitive process through which students examine problems, evaluate their reasoning and solution strategies, and draw conclusions based on careful consideration of evidence (Dewey, 1933; Schön, 1983). In mathematics learning, reflective thinking enables students not only to obtain correct answers but also to examine how and why a solution is obtained, identify possible errors, and consider alternative strategies. This process is closely related to metacognitive awareness because students need to monitor and evaluate their own thinking during problem solving (Brookfield, 2017; Ng et al., 2023; Ovayolu & Kutlu, 2011). In this study, reflective thinking is examined through four indicators: (1) understanding problems; (2) evaluating solution strategies; (3) concluding; and (4) reflecting on the process and results.

Despite the importance of reflective thinking in mathematics learning, previous studies have reported that elementary school students may have difficulty explaining their mathematical reasoning, evaluating solution strategies, and recognizing errors in their own work. Such difficulties may be related to learning practices that emphasize procedural performance and final answers while providing limited opportunities for students to examine and justify their reasoning (Paris & Ayres, 1994; Rodrigues et al., 2021). When students primarily focus on following procedures and obtaining answers, they may have fewer opportunities to monitor, evaluate, and revise their own thinking. This condition highlights the importance of examining factors that may be associated with the development of reflective thinking in elementary mathematics learning.

In this regard, numeracy ability may be closely associated with reflective thinking because solving numeracy problems requires students to interpret information, apply mathematical concepts, select appropriate strategies, and evaluate the accuracy of their solutions. These processes provide opportunities for students to monitor and examine their own reasoning. From a metacognitive perspective, students' ability to regulate their thinking through planning, monitoring, and evaluation is closely connected to reflective thinking (Eastwood et al., 2011; Zwozdiak-Myers, 2018). Students with stronger numeracy skills may therefore have greater conceptual resources to examine mathematical relationships, evaluate solution strategies, and revise their reasoning. This conceptual relationship provides a basis for empirically examining the association between numeracy ability and reflective thinking in elementary school mathematics learning (Adelia et al., 2024b).

Previous research has demonstrated the importance of mathematical reasoning and metacognitive processes in developing students' higher-order thinking (Kramarski & Mevarech, 2003; Lithner, 2008).

Research has also examined numeracy in relation to problem solving, reasoning, and various higher-order thinking outcomes. However, empirical studies specifically examining the relationship between numeracy ability and reflective thinking among elementary school students remain limited. Existing studies have more frequently examined numeracy as an outcome of particular instructional approaches or investigated reflective thinking in relation to learning models and other cognitive characteristics. Consequently, the extent to which numeracy ability is associated with reflective thinking at the elementary school level remains insufficiently understood. This gap is important because both competencies require students to interpret mathematical information, regulate their reasoning, and evaluate solutions, yet their empirical relationship has not been sufficiently established.

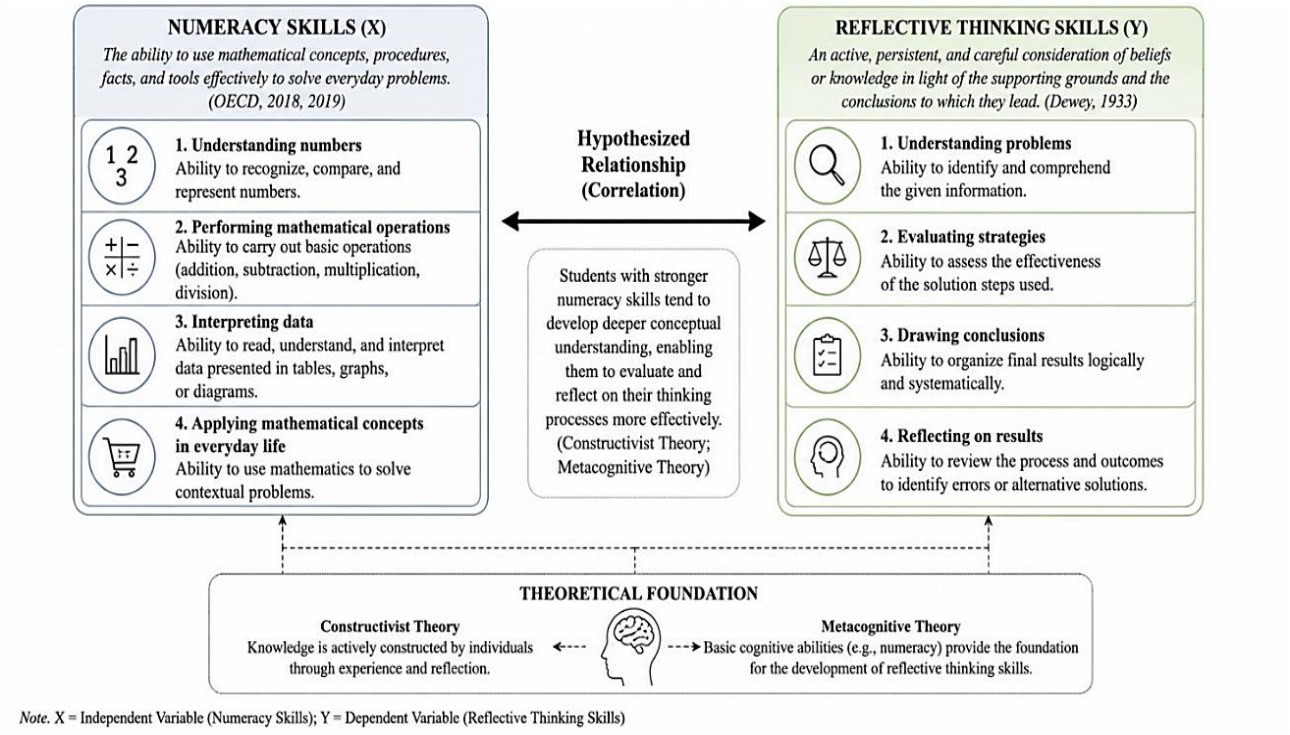

Figure 1. Conceptual Framework of the Relationship between Numeracy and Reflective Thinking

Based on the identified research gap, this study investigates the following research question: Is there a significant relationship between numeracy ability and reflective thinking among elementary school students in mathematics learning? Accordingly, the purpose of this study is to analyze the relationship between numeracy ability and reflective thinking among elementary school students. The findings are expected to contribute to mathematics education research by providing empirical evidence on the relationship between these two competencies and offering practical insights for teachers in designing mathematics learning that integrates numeracy development with opportunities for students to examine, evaluate, and reflect on their mathematical reasoning.

METHODOLOGY

Research Design

This study employed a quantitative correlational research design to examine the relationship between Numeracy Ability (the independent variable) and reflective thinking (the dependent variable) among elementary school students. A correlational approach was adopted to identify the strength and direction of the relationship between the two variables without manipulating the research conditions.

Participant

The participants were 134 fourth- and fifth-grade students from several elementary schools in Kartoharjo District, Madiun City, Indonesia. The purposive sampling procedure was based on participants' suitability for the research objective and the accessibility of the participating schools. Fourth- and fifth-grade students were considered appropriate because the study specifically examined numeracy and reflective-thinking competencies through structured mathematical tasks at the upper-elementary level. The study was conducted during the odd semester of the 2024/2025 academic year.

Data Collection

Data were collected through classroom-based assessments administered directly to the participants. Students completed a Numeracy Ability test followed by a reflective thinking test under the supervision of the researchers. Prior to data collection, permission was obtained from the participating schools, and the administration procedures were standardized to ensure consistency across schools.

Instrument

Two research instruments were employed: a numeracy ability test and a reflective thinking test. The numeracy ability test consisted of 66 items, including multiple-choice and essay questions, covering four indicators: number understanding, mathematical operations, data interpretation, and the application of mathematics in everyday contexts. The reflective thinking test consisted of 17 items designed to assess students' ability to understand mathematical problems, evaluate solution strategies, draw conclusions, and reflect on the obtained results. Prior to data collection, both instruments underwent content validity, empirical validity, and reliability testing. Content validity based on expert judgment yielded Aiken's V coefficients ranging from 0.75 to 1.00 for both instruments, indicating acceptable to very high content validity. The empirical validity analysis showed item-total correlation coefficients ranging from 0.436 to 0.877 for the numeracy ability test and from 0.453 to 0.645 for the reflective thinking test. Reliability analysis using Cronbach's alpha yielded coefficients of 0.750 for the numeracy ability test and 0.736 for the reflective thinking test. These results indicate that both instruments demonstrated adequate validity and reliability for measuring the intended constructs.

Data Analysis

Data analysis was performed using IBM SPSS Statistics. Descriptive statistics were first calculated to summarize students' Numeracy Ability and reflective thinking scores. Subsequently, normality and linearity tests were conducted as prerequisite analyses to ensure that the assumptions for parametric testing were satisfied. Finally, the Pearson Product-Moment correlation test was employed to determine the strength, direction, and significance of the relationship between Numeracy Ability and reflective thinking among elementary school students.

FINDINGS

Descriptive Statistics

Table 1. Descriptive Statistics of Numeracy Ability and Reflective Thinking

Variable	N	Minimum	Maximum	Mean	Standard Deviation
Numeracy ability	134	45	95	72.38	10.21
Reflective thinking	134	40	92	70.15	9.87

Based on Table 1, the mean score of students' numeracy ability was 72.38 with a standard deviation of 10.21, while the mean score of reflective thinking was 70.15 with a standard deviation of 9.87. The numeracy ability scores ranged from 45 to 95, whereas the reflective-thinking scores ranged from 40 to 92. Thus, the observed scores indicate considerable variation among students in both variables. The difference between the

minimum and maximum scores also indicates that students demonstrated varying levels of numeracy and reflective thinking. The relatively similar standard deviations (10.21 for numeracy ability and 9.87 for reflective thinking) indicate a comparable degree of score dispersion in the two variables. Overall, the mean scores suggest that the students' numeracy ability and reflective thinking were at a moderate level according to the study's scoring criteria. The data on students' numeracy and reflective thinking abilities are presented in Figure 2 below.

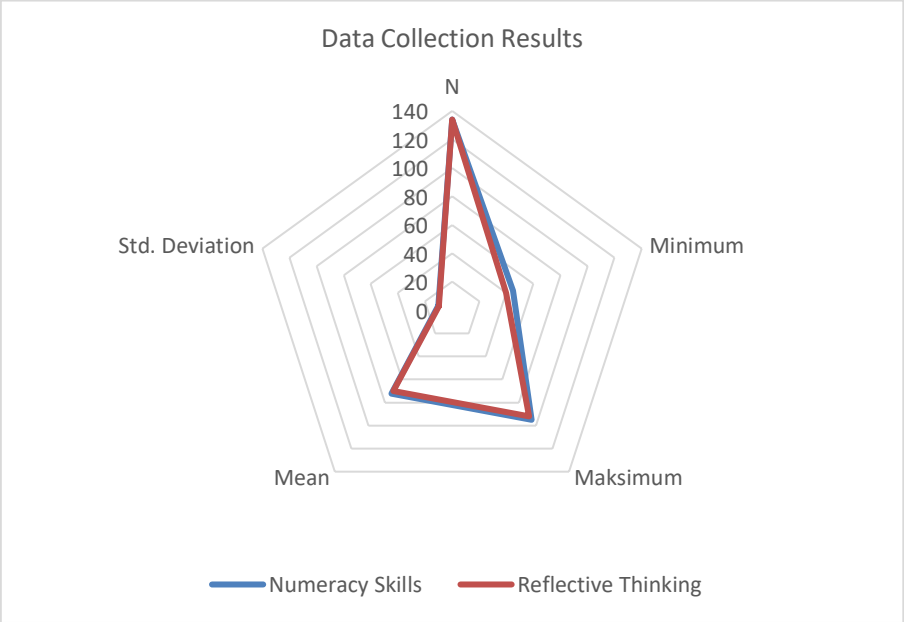

Figure 2. Data Collection Results

Based on Figure 2, students' numeracy and reflective thinking abilities are in the moderate category.

Normality Test

A normality test was conducted to determine whether the distributions of the numeracy ability and reflective-thinking scores met the assumption of normality required for parametric analysis. The Kolmogorov–Smirnov test was used, and the results are presented in Table 2.

Table 2. Normality Test Results

Variable	Kolmogorov–Smirnov Sig.	Decision
Numeracy ability	0.087	Normally distributed
Reflective thinking	0.092	Normally distributed

As shown in Table 2, the significance value for numeracy ability was 0.087, while that for reflective thinking was 0.092. Both values are greater than the significance level of 0.05. Therefore, the null hypothesis of non-normality is not supported, indicating that the distributions of both variables do not significantly deviate from normality. The normality results indicate that the data satisfy the normality assumption for the subsequent parametric analysis. Therefore, the relationship between numeracy ability and reflective thinking can appropriately be examined using the Pearson Product-Moment correlation test.

Linearity Test

A linearity test was conducted to determine whether the relationship between numeracy ability and reflective thinking was linear. The results are presented in Table 3. The significance value of the deviation from linearity was 0.214, which is greater than 0.05. This indicates that there is no statistically significant deviation from a linear relationship between numeracy ability and reflective thinking. In other words, the pattern of association between the two variables can be adequately represented by a linear relationship. The fulfillment

of the linearity assumption supports the use of the Pearson Product-Moment correlation analysis to examine the strength and direction of the relationship between numeracy ability and reflective thinking. Importantly, this result indicates the suitability of a linear association model but does not imply a causal relationship between the two variables.

Table 3. Linearity Test Results

Relationship	Deviation from Linearity Sig.	Decision
Numeracy ability – Reflective thinking	0.214	Linear

Pearson Product-Moment Correlation

The Pearson Product-Moment correlation test was conducted to examine the direction and strength of the relationship between students' numeracy ability and reflective thinking. The results show a Pearson correlation coefficient of $r = 0.623$ with a significance value of $p < 0.001$. Because the p-value is lower than the 0.05 significance level, the null hypothesis stating that there is no significant relationship between numeracy ability and reflective thinking is rejected. Thus, the findings demonstrate a statistically significant positive relationship between the two variables. The correlation coefficient of 0.623 indicates a strong positive relationship based on the interpretation criteria applied in this study. This means that students with higher numeracy ability scores also tend to have higher reflective-thinking scores. However, because this study employed a correlational design, this finding should be interpreted as an association rather than a causal effect. The coefficient of determination ($R^2 = 0.388$) indicates that approximately 38.8% of the variance in reflective-thinking scores is statistically associated with variation in numeracy ability. In comparison, the remaining 61.2% is attributable to other factors not examined in this study. This finding suggests that numeracy ability is meaningfully related to reflective thinking, although it does not explain all variation in students' reflective-thinking performance. Figure 3 presents the scatterplot of students' numeracy ability and reflective-thinking scores.

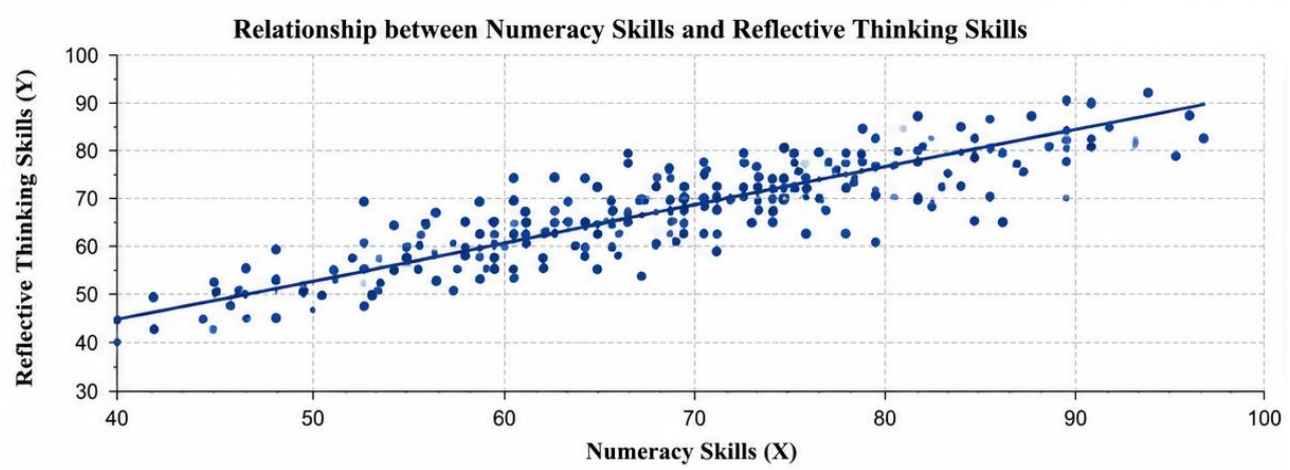

Figure 3. The Relationship between Numeracy and Reflective Thinking Skill

The scatterplot shows an upward pattern of data points, indicating a positive association between numeracy ability and reflective thinking. In general, students who obtained higher numeracy scores also tended to obtain higher reflective-thinking scores. The distribution of the points around the upward trend indicates that the relationship is not perfectly linear, meaning that students with similar numeracy scores may still demonstrate different levels of reflective thinking. The scatterplot is consistent with the Pearson correlation ($r = 0.623$, $p < 0.001$), indicating a statistically significant, strong positive relationship. The pattern also supports the linearity test result, which showed no significant deviation from linearity ($p = 0.214$). Nevertheless, the dispersion of the points demonstrates that numeracy ability alone does not completely account for differences in students' reflective-thinking performance. This is consistent with the coefficient of

determination (R^2 = 0.388), indicating that other factors may also be associated with students' reflective-thinking abilities.

DISCUSSION

The findings of this study demonstrate a positive and statistically significant relationship between Numeracy Ability and reflective thinking among elementary school students in mathematics learning (r = 0.623, $p < 0.001$). The correlation coefficient indicates a relatively strong positive association, suggesting that students with higher Numeracy Ability tend to demonstrate higher levels of reflective thinking when solving mathematical problems. The coefficient of determination (R^2 = 0.388) further indicates that 38.8% of the variance in reflective-thinking scores is statistically associated with variation in Numeracy Ability. In comparison, the remaining 61.2% may be related to other factors not examined in this study. This finding suggests that Numeracy Ability is meaningfully associated with students' reflective thinking, particularly in mathematical problem-solving activities that require students to interpret quantitative information, evaluate solution strategies, and examine the appropriateness of their answers. However, given the study's correlational design, the finding should be interpreted as an association rather than a causal effect.

The significant relationship identified in this study can be explained from the perspective of constructivist learning theory, which holds that knowledge is actively constructed through learners' experiences and reflection on them. In mathematics education, conceptual understanding develops when students actively engage with problems, connect new mathematical ideas with prior knowledge, and evaluate the effectiveness of the strategies they employ. This learning process is closely associated with reflective thinking because students are required not only to obtain correct answers but also to understand the reasoning underlying each solution. Dewey (1933) described reflective thinking as an active, persistent, and careful consideration of beliefs or knowledge in light of the evidence supporting them and the conclusions they produce. Within mathematics learning, reflective thinking involves reviewing solution procedures, examining the validity of mathematical reasoning, recognizing mistakes, and improving subsequent problem-solving strategies. Such activities require adequate Numeracy Ability because students cannot critically evaluate mathematical reasoning without first understanding the quantitative information presented in contextual problems. Therefore, numeration functions as a prerequisite that enables students to engage in meaningful reflection during mathematical problem solving (Demirel et al., 2015; Erdoğan, 2020).

The findings of this study are consistent with previous studies demonstrating a close relationship between numeracy ability and reflective thinking. Kurniawati et al. (2023) reported that students who successfully solved numeracy literacy problems exhibited more comprehensive reflective thinking processes, particularly when reviewing solution procedures and evaluating the accuracy of calculations. Likewise, Mukti et al. (2024) found that students with stronger numeracy competence demonstrated better reflective thinking while solving geometry and measurement problems. Their findings indicate that students with adequate numerical understanding tend to reconsider their solution strategies before making final decisions. In contrast, students with weaker numeracy skills often terminate the problem-solving process immediately after obtaining an answer without conducting further evaluation. Similar conclusions were reported by Qurratul'Aini and Susanah (2024), who found that students' cognitive characteristics strongly influenced reflective thinking in solving AKM numeracy problems. Students with systematic cognitive styles consistently performed more complete evaluations of mathematical solutions than those with intuitive cognitive styles. These findings indicate that numeracy ability provides students with conceptual resources for evaluating mathematical reasoning systematically and critically. Further support is provided by Waluya et al. (2024), who explained that reflective thinking develops through students' construction of mathematical understanding during numeracy problem solving. Their study showed that students with stronger numerical reasoning demonstrated more structured reflective processes by monitoring, evaluating, and revising their mathematical procedures. Similarly, Setiyani et al. (2022) emphasized that appropriate scaffolding during numeracy activities encourages students to reconsider their reasoning and gradually develop more sophisticated

reflective mathematical thinking. Taken together, these studies suggest that the relationship between numeracy ability and reflective thinking may be understood through the processes involved in mathematical problem solving, in which students not only work with quantitative information but also examine, evaluate, and revise the strategies and results they produce. Thus, meaningful numeracy experiences may provide opportunities for students to engage in monitoring, evaluation, and revision, which are important processes underlying reflective thinking (Kurniawati et al., 2023; Mukti et al., 2024; Qurratul'Aini & Susanah, 2024; Waluya et al., 2024).

The significant relationship identified in this study may be explained through the cognitive and higher-order thinking processes involved in mathematical problem solving. Numeracy ability requires students not only to perform arithmetic operations but also to interpret quantitative information, identify relationships among mathematical concepts, select appropriate solution strategies, evaluate the correctness of results, and make evidence-based decisions. These activities engage metacognitive regulation, particularly planning, monitoring, and evaluating one's own thinking processes. Reflective thinking emerges when students consciously examine the effectiveness of their reasoning, recognize possible misconceptions or errors, and revise inappropriate strategies before concluding. In this sense, numeracy provides a cognitive foundation for students to engage in reflective thinking while solving mathematical problems. This interpretation is supported by Kholid et al. (2020), who argued that reflective thinking develops through continuous monitoring and evaluation of mathematical reasoning during problem solving. Similarly, Sa'dijah et al. (2020) found that proficient mathematics students demonstrated reflective characteristics by verifying solutions, identifying errors, and considering alternative approaches before making final decisions. Tisngati and Genarsih (2021) further emphasized that reflective thinking is closely associated with mathematical reasoning, as students need to evaluate the accuracy and consistency of their cognitive processes throughout problem solving. From the perspective of higher-order thinking skills, Ismafitri et al. (2022) argued that numeracy literacy represents an important component of higher-order thinking because students must integrate conceptual understanding with reasoning and decision-making when solving contextual problems. Likewise, Sirota et al. (2021) demonstrated that stronger cognitive reflection is associated with more careful evaluation of available information before making judgments, while Aliya et al. (2025) found that students with reflective cognitive styles demonstrated higher levels of critical thinking when solving algebraic numeracy problems. Collectively, these findings suggest that the relationship between numeracy ability and reflective thinking is closely connected to students' capacity to regulate, evaluate, justify, and revise their mathematical reasoning, particularly when they encounter problems that require more than routine computation (Aliya et al., 2025; Ismafitri et al., 2022; Kholid et al., 2020; Sa'dijah et al., 2020; Sirota et al., 2021; Tisngati & Genarsih, 2021).

The findings of this study also have important implications for mathematics instruction at the elementary school level. Given the significant relationship between numeracy ability and reflective thinking identified in this study, mathematics learning should provide opportunities for students to develop both competencies through meaningful mathematical experiences. Teachers can design learning activities that encourage students to interpret contextual mathematical problems, explain their reasoning, compare alternative solution strategies, and evaluate the appropriateness of their answers. Such learning environments may support students in constructing mathematical understanding through inquiry and reflection rather than relying solely on procedural calculations. Previous studies support the use of meaningful, student-centered approaches to developing these competencies. Maghfiroh et al. (2021), for example, reported that the Indonesian Realistic Mathematics Education (PMRI) approach improved elementary students' numeracy literacy by presenting mathematical concepts through authentic contexts that required reasoning and interpretation (Maghfiroh et al., 2021). Noer et al. (2024) similarly reported improvements in mathematical reflective thinking through Project-Based Learning, in which students engaged in authentic investigations and evaluated their problem-solving processes (Noer et al., 2024). Further evidence comes from Elisa and Saputro (2024) and Syadzali et al. (2024), who found that Problem-Based Learning integrated with Realistic Mathematics Education supported students' numeracy literacy through contextual problem investigation and evaluation of alternative solutions

(Elisa & Saputro, 2024; Syadzali et al., 2024). Rachman et al. (2025) also reported that numeracy-oriented electronic worksheets (e-LKPD) supported reflective mathematical thinking through structured processes of analysis, evaluation, and reflection (Rachman et al., 2025). In addition, mathematics games and technology-based learning media have been associated with improvements in children's numeracy development, mathematical understanding, motivation, and engagement (Ardi & Desstya, 2023; Cohrssen & Niklas, 2019; Yustitia et al., 2024; Zaenal et al., 2022). Taken together, these studies suggest that contextual, inquiry-oriented, and student-centered learning environments may provide suitable opportunities for strengthening numeracy while simultaneously engaging students in the monitoring, evaluation, and reflection processes associated with reflective thinking.

An important contribution of this study lies in its focus on elementary school students. Although previous studies have extensively investigated numeration, reflective thinking, and mathematical problem solving, many of them have focused on junior secondary school students, senior secondary school students, or prospective mathematics teachers (Aliya et al., 2025; Kholid et al., 2020; Waluya et al., 2024). Research specifically examining the relationship between Numeracy Ability and reflective thinking among elementary school students remains relatively limited. This study, therefore, extends existing knowledge by providing empirical evidence that Numeracy Ability is significantly associated with reflective thinking from the early stages of formal mathematics education. Considering that elementary school represents the foundational period for developing mathematical reasoning, strengthening numeration during this stage may provide long-term benefits for students' cognitive development and subsequent mathematics achievement (Hartatik, 2020; Igo et al., 2024; Perdana & Suswandari, 2021).

Table 4. Synthesis of the Relationship Between Numeracy Ability and Reflective Thinking

Aspect	Findings of the Present Study	Educational Implication
Numeracy Ability	Numeracy Ability is positively and significantly correlated with reflective thinking ($r = 0.623$, $p < 0.001$). Students with higher Numeracy Ability tend to demonstrate stronger reflective thinking skills.	Strengthening Numeracy Ability should become a priority in elementary mathematics learning because it provides the foundation for developing reflective thinking and other higher-order thinking skills.
Reflective Thinking	Students with better Numeracy Ability are better able to evaluate solution strategies, justify mathematical reasoning, identify errors, and revise their solutions.	Teachers should encourage students to explain their reasoning, evaluate alternative strategies, and reflect on their mathematical solutions.
Mechanism of Relationship	Numeracy Ability supports reflective thinking by enabling the understanding of contextual problems, the selection of strategies, the monitoring of reasoning, the evaluation of results, and the revision of solutions.	Learning activities should emphasize complete problem-solving processes rather than focusing only on obtaining correct answers.
Connection with HOTS and Metacognition	Numeracy Ability is closely associated with higher-order thinking skills (HOTS) and metacognitive regulation, which facilitate reflective thinking.	Instruction should foster analysis, evaluation, self-monitoring, and self-regulation through meaningful mathematical tasks.
Instructional Approaches and Media	Contextual learning, PMRI, Problem-Based Learning, Project-Based Learning, numeracy-oriented e-LKPD, educational games, and	Teachers are encouraged to integrate contextual approaches and innovative learning media to provide

Aspect	Findings of the Present Study	Educational Implication
	mobile learning effectively strengthen both Numeracy Ability and reflective thinking.	meaningful mathematical experiences.
Novelty of the Study	This study provides empirical evidence of the relationship between Numeracy Ability and reflective thinking among elementary school students, an area that has received limited empirical attention.	The findings highlight the importance of strengthening numeration from the elementary level as a foundation for developing reflective thinking and lifelong mathematical reasoning.

CONCLUSION

Based on the research findings, there is a positive and statistically significant relationship between elementary school students' numeracy ability and reflective thinking in mathematics learning. The Pearson correlation analysis yielded $r = 0.623$ ($p < 0.001$), indicating a strong positive relationship between the two variables. Furthermore, the coefficient of determination ($R^2 = 0.388$) indicates that approximately 38.8% of the variance in students' reflective-thinking scores is statistically associated with variation in numeracy ability. In comparison, the remaining 61.2% may be associated with other factors not examined in this study. Thus, students with higher numeracy ability scores tend to demonstrate higher levels of reflective thinking. This finding highlights the importance of considering numeracy and reflective thinking as related competencies in elementary mathematics learning. From an instructional perspective, mathematics learning can provide opportunities for students to develop both competencies through contextual and problem-based tasks, reflective discussions, and open-ended questions. Teachers can encourage students to explain the reasoning behind their answers, evaluate the strategies they use, identify errors, and review their solution processes. Such learning experiences may provide a meaningful context for strengthening students' numeracy while simultaneously engaging them in reflective processes.

This study has several limitations. First, because the study employed a correlational design, the findings indicate an association between numeracy ability and reflective thinking and do not establish a causal relationship. Second, the coefficient of determination shows that numeracy ability accounts for only part of the variation in reflective-thinking performance, suggesting that other relevant factors were not examined in this study. Future research could employ experimental, longitudinal, or mixed-methods designs to investigate the development of numeracy and reflective thinking in greater depth. Further studies could also examine other factors associated with students' reflective thinking, such as metacognitive awareness, instructional approaches, mathematical reasoning, and problem-solving experiences.

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