



The relationship between emotional intelligence and mathematical problem-solving skills in elementary school students

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Abstract: Mathematical problem-solving skills are an important aspect of mathematics education and are influenced by various factors, including emotional intelligence. This study examined the relationship between emotional intelligence and mathematical problem-solving skills among elementary school students. This study employed a quantitative correlational design. The participants consisted of 26 fifth-grade elementary school students. Data were collected using an emotional intelligence questionnaire and a mathematical problem-solving test, and analyzed using the Spearman rank correlation test. The results showed a positive correlation between emotional intelligence and mathematical problem-solving skills; however, the relationship was not statistically significant. This may be attributed to the small sample size, the relatively homogeneous distribution of test scores, and the uniform learning environment. These findings suggest that emotional intelligence is not the sole factor influencing students' mathematical problem-solving skills. Other contributing factors include cognitive abilities, learning motivation, student engagement, teachers' roles, instructional strategies, and family support.

Keywords: emotional intelligence; mathematical problem solving; mathematics learning

Hubungan kecerdasan emosional dengan kemampuan pemecahan masalah matematis peserta didik di Sekolah Dasar

Abstrak: Kemampuan pemecahan masalah matematis merupakan aspek penting dalam pendidikan matematika dan dipengaruhi oleh berbagai faktor, termasuk kecerdasan emosional. Penelitian ini mengkaji hubungan antara kecerdasan emosional dan kemampuan pemecahan masalah matematis pada peserta didik sekolah dasar. Penelitian ini menggunakan desain kuantitatif korelasional. Pesertanya terdiri dari 26 peserta didik kelas lima sekolah dasar. Data dikumpulkan melalui kuesioner kecerdasan emosional dan tes pemecahan masalah matematis, kemudian dianalisis menggunakan uji korelasi Spearman Rank. Hasilnya menunjukkan adanya korelasi positif antara kecerdasan emosional dan kemampuan pemecahan masalah matematis, namun hubungan tersebut tidak signifikan secara statistik. Hal ini mungkin disebabkan oleh ukuran sampel yang kecil, distribusi skor tes yang relatif homogen, dan lingkungan belajar yang seragam. Temuan ini menunjukkan bahwa kecerdasan emosional bukan satu-satunya faktor yang memengaruhi kemampuan peserta didik dalam memecahkan masalah matematika. Faktor lain yang turut berkontribusi meliputi kemampuan kognitif, motivasi belajar, keterlibatan peserta didik, peran guru, strategi pengajaran, dan dukungan keluarga.

Kata Kunci: kecerdasan emosional; pemecahan masalah matematika; pembelajaran matematika

INTRODUCTION

Education is a place for individuals to develop, particularly in intellectual terms (Arafah et al., 2023). Additionally, education plays an important role in shaping students' abilities and

character. [Tamaledu et al. \(2021\)](#) note that education makes humans more civilized by teaching them to become better. In the process, individuals begin to learn and acquire skills, insights, and a broader understanding.

Mathematics is an important subject in education. According to [Ginanjari \(2019\)](#), mathematics is taught to all students from elementary school to develop logical, analytical, structured, critical, and creative thinking skills, as well as teamwork skills and problem-solving skills relevant to everyday life. Therefore, mathematics education at the elementary school level is an important factor in students' understanding of more complex concepts in later educational stages ([Nurhaswinda & Parisu, 2025](#); [Rahma et al., 2021](#)).

Mathematics learning requires mastery of various skills, with problem-solving being one of the most essential. [Kurniati et al. \(2025\)](#) emphasize that this competence is crucial for students, particularly in meeting the demands of the 21st century, as it enables learners to apply mathematical knowledge in everyday contexts ([Rahmat & Arham, 2022](#)). Moreover, problem-solving skills form the basis for developing logical, systematic, and comprehensive thinking, training students to break down complex problems into manageable components and follow structured steps toward a solution ([Hutagaol et al., 2024](#)). [Polya \(2004\)](#) highlights that problem-solving abilities lie at the heart of mathematical competence, as they encompass not only methods but also the essential skills needed to tackle unfamiliar challenges effectively.

Despite its importance, learning conditions in Indonesia indicate that students' problem-solving skills remain relatively low. This is supported by studies such as ([Yuniara et al., 2023](#)), which found that students' mathematical problem-solving skills in Indonesia are low across all stages of the problem-solving process. Furthermore, the findings of [Abjad et al. \(2022\)](#) revealed that 18 out of 32 students demonstrated low mathematical problem-solving skills. Similarly, [Pratiwi & Alyani \(2022\)](#) reported comparable results, with 18 out of 30 students demonstrating low levels of mathematical problem-solving skills.

Students' low ability to solve mathematical problem-solving skills is evident from the difficulties they face in making accurate calculations, understanding the progression of the story, and determining strategies or methods for solving them ([Aryashanti & Witanto, 2025](#)). Students often write only numbers without explaining the known information or what is being asked, leading to less accurate calculations. Additionally, students are still not precise in applying the formulas or solution strategies provided by the teacher, which often leads to errors in calculations ([Saputra, 2024](#)).

These difficulties are becoming even greater because mathematics is still considered scary by some students ([Wardana & Fitriyani, 2019](#)). They not only feel afraid, but also feel anxious every time they learn mathematics ([Riyanti et al., 2025](#)). This is in line with the results of an interview conducted with one of the elementary school teachers in Samarinda City, who stated that many students feel confused, doubtful, and anxious before trying to solve them. Some students try to understand the problem with the strategies they know, but others give up immediately, especially those who have failed before.

The anxiety and doubts students have when facing mathematical problem-solving reflect their suboptimal emotional management skills (Nurhidayati, 2024). This is related to students' emotional intelligence, particularly their ability to manage negative emotions in challenging learning situations. Students with good emotional intelligence tend to manage anxiety while still seeking problem-solving strategies. In contrast, students with low emotional intelligence are more likely to feel depressed and tend to give up when faced with difficulties (Daiana et al., 2024).

Emotional intelligence is understood as an individual's ability to recognize and manage personal emotions, motivate themselves, understand others' emotions, and build positive relationships (Mirawati et al., 2023; Sudiartini, 2024). Students with high emotional intelligence tend to remain optimistic and show perseverance when faced with challenging math problems. In reality, however, students often feel anxious and stressed because they are aware of their limitations (Amalia et al., 2024). If someone lacks emotional intelligence, they will easily give up, lack motivation to learn, and have difficulty focusing on the material being taught (Simbolon, 2024). These conditions indicate that emotional factors play a significant role in shaping students' learning processes and responses to academic challenges. Therefore, emotional intelligence plays an important role in supporting students' mathematical problem-solving (Astuti et al., 2024; Nata et al., 2024).

Given the issues discussed, this study aims to examine the relationship between emotional intelligence and students' mathematical problem-solving skills. This research is important because emotional intelligence helps students manage their emotions and stay resilient when facing difficulties in learning mathematics. This study aims to contribute to the development of non-cognitive aspects, particularly emotional intelligence, in elementary school education. Additionally, the results of this study can serve as a reference for teachers in designing learning strategies that not only focus on cognitive aspects but also emphasize the development of students' emotional aspects, thereby enhancing their mathematical problem-solving skills.

METHOD

This study is a quantitative research with a correlational design. With this approach, the research was conducted to objectively and measurably analyze the relationship between emotional intelligence and students' mathematical problem-solving in elementary schools. The quantitative approach was chosen because the data are presented numerically and analyzed using statistics, so the results can provide a clear picture of the strength of the relationship between the two variables. In correlation analysis, if the data are normally distributed, the Pearson product-moment test is used. However, if the data are not normally distributed, a non-parametric test, namely Spearman's rank, is used. Therefore, in this study, the Spearman Rank test was used because the normality test results indicated that the data are not normally distributed.

This research was conducted with fifth-grade students at an elementary school in Samarinda during the even semester of the 2025/2026 academic year. The population

comprised all fifth-grade students, who were divided into two classes. The sample in this study was Class V A, consisting of 26 students. The sampling technique used was purposive sampling, in which the sample was selected based on specific criteria determined by the homeroom teacher, namely classes that aligned with the research objectives (Sugiyono, 2023). The variables examined were emotional intelligence (independent variable) and mathematical problem-solving (dependent variable).

The data were collected through interviews, questionnaires, and tests of students' mathematical problem-solving. The questionnaire used to measure emotional intelligence contained 15 statements, while the problem-solving test contained 4 questions.

Before being used for data collection, the emotional intelligence questionnaire and the mathematical problem-solving test were validated by three expert lecturers in mathematics. This validation assessed the suitability of the content, the clarity of the language, and the consistency of the items with the measured indicators. After being revised in accordance with the validators' suggestions, the instruments were deemed suitable for use. The emotional intelligence scores were analyzed as the independent variable to examine their relationship with students' problem-solving test results using correlational analysis. Interviews were also used as supporting data to identify other factors outside the research variables that may influence learning outcomes.

Furthermore, the questionnaire and test instruments were empirically tested on sixth-grade students from the same elementary school where the research was conducted. These trials aimed to assess the clarity of the instruments and to evaluate their validity and reliability before being used in the study. The validity of the emotional intelligence questionnaire was assessed using the Pearson product-moment correlation coefficient. The results showed that all correlation coefficients exceeded the significance level of 0.05. Therefore, all items were considered valid. Additionally, the reliability of the emotional intelligence questionnaire was evaluated using Cronbach's alpha, which yielded a value of 0.879, indicating high reliability.

In addition to the questionnaire, the validity and reliability of the mathematical problem-solving test were also assessed. The test's validity was assessed using the Pearson product-moment correlation coefficient, and all items had coefficients exceeding the significance level of 0.05. Therefore, all items were considered valid. The reliability of the test was assessed using Cronbach's alpha, resulting in a coefficient of 0.736, indicating good internal consistency.

In the next stage, the discrimination index and difficulty index were calculated for each item in the mathematical problem-solving test. The results indicated that Question 1 was categorized as easy, Questions 2 and 3 as moderate difficulty, and Question 4 as difficult. Meanwhile, the discrimination index results showed that all items were in the good category. Based on expert judgment, field testing, and instrument feasibility analysis (including validity, reliability, difficulty index, and discrimination index), it can be concluded that the emotional intelligence questionnaire and the mathematical problem-solving test met the criteria for use in this study.

RESULT AND DISCUSSION

Based on the collected data, this study involved 26 students as participants. The data analyzed consisted of scores from the emotional intelligence questionnaire and the mathematical problem-solving test. As an initial step, descriptive statistical analysis was conducted to provide a general overview of the data. This analysis included measures such as the minimum, maximum, mean, and standard deviation for each variable. All descriptive data were processed using SPSS version 27, and the results are presented in Table 1.

Table 1. Results of Statistical Descriptive Analysis

Variabel	N	Minimum	Maximum	Mean	Std. Deviation
Emotional Intelligence	26	22	56	45.69	7.562
Mathematical Problem-Solving Skills	26	37	100	77.54	16.789
Valid N (listwise)	26				

Based on Table 1, the emotional intelligence variable shows that 26 students participated, with a minimum score of 22 and a maximum score of 56. The mean score was 45.69, indicating that, on average, students' emotional intelligence tended to be in the moderate-to-high category, with a standard deviation of 7.562, suggesting a moderate level of dispersion. Meanwhile, the mathematical problem-solving variable also involved 26 students, with scores ranging from 37 to 100. The mean score was 77.54, indicating relatively good problem-solving skills, while the standard deviation of 16.789 reflects a wider variation in students' performance.

Table 2. Normality Test using Shapiro-Wilk

Variabel	Statistic	Sig.	Method
Emotional Intelligence	0.886	0.008	<i>Shapiro-Wilk</i>
Mathematical Problem-Solving Skills	0.900	0.016	

Prior to conducting hypothesis testing, a normality test was performed to determine whether the data were normally distributed. The Shapiro–Wilk test was employed in this study, as it is considered more appropriate for sample sizes of fewer than 50. The results of the normality test are presented in Table 2, showing the significance values for emotional intelligence (*Sig.* = 0.008) and mathematical problem-solving skills (*Sig.* = 0.016) are both less than 0.05. This indicates that the data for both variables are not normally distributed. Therefore, this study employed the Spearman rank correlation test, a nonparametric method, to examine the relationship between emotional intelligence and mathematical problem-solving skills.

Based on the results presented in Table 3, the Spearman correlation coefficient was 0.342, indicating a positive relationship between emotional intelligence and mathematical problem-solving skills. This finding suggests that students with higher emotional intelligence tend to demonstrate better performance in solving mathematical problems. However, this

relationship cannot be generalized, as the statistical test yielded a significance value, *Sig.* (2-tailed) of 0.087, which is greater than 0.05. Thus, the correlation between the two variables is not statistically significant.

Table 3. Correlation Test using Spearman Rank

Correlation Test		Emotional Intelligence	Mathematical Problem-Solving Skills
Emotional Intelligence	Correlation Coefficient	1.000	0.342
	Sig. (2-tailed)	-	0.087
	N	26	26
Mathematical Problem-Solving Skills	Correlation Coefficient	0.342	1.000
	Sig. (2-tailed)	0.087	-
	N	26	26

Several factors may explain the non-significance despite the presence of a positive correlation. First, the small sample size (26 students from one class) likely reduces the statistical power of the analysis, making it more difficult to detect a significant relationship. Based on the explanation by (Cohen et al., 2007), a larger sample size helps achieve adequate statistical power, whereas a limited sample can decrease the ability to detect significant relationships. Similarly, Sugiyono (2019) states that the larger the sample size, the smaller the margin of error; therefore, a minimum sample size of around 30 is generally recommended in quantitative research. Second, the score distribution may be relatively homogeneous, with limited variability among students. This is reflected in the descriptive statistics, where students' scores tend to be concentrated within a certain range, thereby weakening the correlation coefficient. Limited variation reduces the statistical test's ability to detect meaningful relationships between variables.

In addition, contextual factors such as similar learning environments, teaching methods, and student characteristics within a single class may have contributed to the sample's homogeneity. These conditions may obscure the true relationship between the variables. Nevertheless, the direction of the positive relationship observed in this study is consistent with the findings of (Simamora et al., 2024), who reported a significant correlation between emotional intelligence and mathematical problem-solving skills in a larger sample of 54 students. Students with higher emotional intelligence tend to be more enthusiastic, persistent, and able to regulate their emotions when faced with complex mathematical tasks. Therefore, although the results of this study are not statistically significant, they still provide an important indication of the potential relationship between emotional intelligence and mathematical problem-solving, warranting further investigation with larger and more diverse samples and more robust measurement instruments.

Another finding from Ramadina & Marlina (2023) research further indicates a positive relationship between emotional intelligence and mathematical problem-solving. However, based on the criteria for interpreting correlation coefficients, this relationship is classified as

low. The relationship between the two variables is not strong enough to conclude that emotional intelligence is the sole factor influencing students' mathematical problem-solving. Various factors influence mathematical problem-solving. Dwianti & Pedhu (2021) state that emotional intelligence contributes 18% to students' ability to adapt in an academic context, while other factors, such as social support and emotional maturity, account for the remaining 82%. Furthermore, Witraguna & Suryawan (2024) found that learning strategies have a positive influence mathematical problem-solving. The selection of strategies, accompanied by appropriate learning media, can enhance students' enthusiasm for engaging in learning activities (Hasanah et al., 2024).

Beyond individual factors, the application of learning models plays a role in improving students' mathematical problem-solving skills. Putri et al. (2024) state that the implementation of problem-based learning can increase students' active involvement in the learning process, which ultimately has a positive impact on their mathematical problem-solving skills. Problem-based learning can be further combined with differentiated instruction to better accommodate students' diverse characteristics (Sari et al., 2026). Moreover, the family environment also contributes significantly to students' ability to solve mathematical problems. Parents play a role in creating a conducive learning environment at home, fostering children's curiosity and motivation to learn. Furthermore, they can develop children's mathematical thinking skills through daily activities, such as counting ingredients while cooking, measuring distances or travel times, and comparing prices when shopping (Saputra, 2024).

These findings are consistent with results from interviews with fifth-grade teachers at a public elementary school in Samarinda. The teachers revealed that several factors influence mathematics learning, particularly in improving students' mathematical problem-solving skills. These factors include students' ability to regulate their emotions when faced with challenging problems, their motivation and perseverance in attempting to solve both simple and complex problems, and their active participation and cooperation in group discussion. In addition, teachers' roles in providing motivation, positive reinforcement, and family support in creating a conducive learning environment at home contribute to students' learning outcomes.

CONCLUSION

Based on the research findings, it can be concluded that although there is a positive relationship between emotional intelligence and mathematical problem-solving skills, the results are not statistically significant. This lack of significance may be attributed to several factors, including the small sample size, the relatively homogeneous distribution of students' test scores, and the uniform learning environment, in which students are taught by the same teacher using similar instructional methods within the same classroom setting.

These findings also indicate that emotional intelligence is not the sole factor influencing students' skills to solve mathematical problems. Other contributing factors include students' level of engagement during the learning process, the teacher's role, the

implementation of appropriate learning strategies and models, the provision of positive reinforcement, and a supportive and conducive family environment.

Therefore, although the results of this study are not statistically significant, the positive direction of the relationship still indicates a potential association between emotional intelligence and mathematical problem-solving skills. This suggests that emotional intelligence can support students' success in learning mathematics.

Based on these findings, further research is recommended to explore other factors that may influence mathematical problem-solving skills in greater depth, from both internal and external perspectives. Future studies may consider variables such as students' active engagement in learning, the teacher's contribution to creating an effective and conducive learning environment, the implementation of appropriate instructional strategies and models, the provision of positive reinforcement, and family support. In addition, the development of research designs involving larger and more diverse samples, as well as the use of various methodological approaches such as mixed methods, is expected to provide a more comprehensive understanding of the relationship between emotional intelligence and mathematical problem-solving skills.

Thus, future research is expected to complement and strengthen the findings of this study while also contributing more broadly to the development of mathematics learning at the elementary school level.

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