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Relationship between Emotional Intelligence and Mathematical Problem Solving Ability

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ABSTRACT

This study aimed to describe the level of students 'emotional intelligence, the level of students' mathematical problem-solving abilities, and the relationship between emotional intelligence and mathematical problem-solving skills. This research is a quantitative study using the ex post facto correlation method. The research sample was students of class VIII SMP Negeri 3 Teras Boyolali in the 2018/2019 academic year, and the sample was determined using the purposive sampling technique. Data were collected using questionnaires, tests, and documentation. All data were analyzed using descriptive analysis, research data using the product moment formula, and hypothesis testing. The results of the study show that: (1) The emotional intelligence of students with low emotional intelligence is 28.1%, 37.5% moderate, and 34.4% high, Mathematical problem-solving abilities of students with low math problem-solving abilities with a percentage of 29.7%, moderate 35.9%, and high 34.4%, (3) After the data were analyzed using the product moment correlation technique, the correlation coefficient value was obtained from 0.586 and then compared r_{table} with the number. A significant level of 1%, namely 0.2075. It is proven that the results $r_{count} > r_{tabel}$ in this study are substantial, in the sense of the hypothesis which states, "There is a significant relationship between emotional intelligence and the ability to solve math problems in class VIII students of SMP Negeri 3 District Teras Boyolali Regency".

Keywords: Emotional Intelligence, Mathematical Thinking Skills, Problem Solving.

ABSTRAK

Penelitian ini bertujuan untuk mendeskripsikan tingkat kecerdasan emosional siswa, tingkat kemampuan pemecahan masalah matematis siswa, dan hubungan antara kecerdasan emosional dengan kemampuan pemecahan masalah matematis. Penelitian ini merupakan penelitian kuantitatif dengan menggunakan metode korelasi *ex post facto*. Sampel penelitian adalah siswa kelas VIII SMP Negeri 3 Teras Boyolali, dan sampel ditentukan dengan menggunakan teknik *purposive sampling*. Data dikumpulkan menggunakan angket, tes, dan dokumentasi. Semua data dianalisis menggunakan analisis deskriptif, data penelitian menggunakan rumus *product moment*, dan uji hipotesis. Hasil penelitian menunjukkan bahwa: (1) Kecerdasan emosional siswa dengan kecerdasan emosional rendah 28,1%, sedang 37,5%, dan tinggi 34,4%, (2) Kemampuan pemecahan masalah matematis siswa dengan kemampuan pemecahan masalah matematika rendah dengan persentase 29,7%, sedang 35,9%, dan tinggi 34,4%, (3) Setelah data dianalisis dengan menggunakan teknik korelasi *product moment*, diperoleh nilai koefisien korelasi sebesar 0,586 kemudian dibandingkan dengan angka. Taraf signifikan 1% yaitu 0,2075. Hal ini membuktikan bahwa hasil dalam penelitian ini adalah substansial, dalam arti hipotesis yang menyatakan, "Ada hubungan yang signifikan antara kecerdasan emosional dengan kemampuan pemecahan masalah matematika pada siswa kelas VIII SMP Negeri 3 Kecamatan Teras Kabupaten Boyolali".

Kata kunci: Kecerdasaan Emosional, Kemampuan Berpikir Matematika, Pemecahan Masalah.

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Introduction

Mathematics is an essential tool and language of science. Therefore, math is critical for developing science and technology. Through learning mathematics, a person will act based on logical, rational, critical, careful, honest, effective, and efficient thinking. Dealing with a math problem also involves emotional intelligence in overcoming and completing the tasks given to students (Gunawan & Muflihati, 2022; Muflihati, 2022; Orosco, 2014).

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Emotional intelligence is an ability such as the ability to motivate oneself and endure frustration, control impulses and not exaggerate pleasure, regulate mood and keep the burden from paralyzing the ability to think, empathize and pray (Cohen, 2018; de Rooij et al., 2017). Emotional intelligence is closely related to problem-solving skills, especially math problem-solving skills. Although emotional intelligence is primarily concerned with the domain of emotions and interpersonal interactions, it can have an indirect influence on a variety of cognitive abilities, including math problem-solving ability.

Students with high emotional intelligence can successfully carry out the problem-solving thought process (Elias & Dreyfus, 2022; Hamidah et al., 2022; Swidan, 2022). The solution ability itself is the ability of students to solve math problems. Thus, intelligence is needed by individuals to solve math problems that can improve their academic achievement (Gadanidis, 2017; Mujib et al., 2022). Furthermore, emotional intelligence can influence decision-making, problem-solving, problem-solving with others, and creativity and innovation in the educational environment (Alrajhi et al., 2017; Mérida-López & Extremera, 2017).

Emotional intelligence is no less important than academic intelligence, where emotional intelligence actually determines a person's positive attitude, ability to see problems, ability to overcome failure and will achieve success (Bartley & Ingram, 2018; Jokikokko et al., 2017; Sloan et al., 2016). Thus emotional intelligence will give strength to each individual to achieve that success. Success is a process that someone does not immediately obtain. This is in accordance with the opinion that a person's success in life is primarily determined by his ability to solve the problems he faces (de Groot-Reuvekamp et al., 2018; McDermott & Allen, 2015). Problem solving ability is not only seen in cognitive.

Problem-solving is more important to teach students than just giving routine problems that only contain links between cognitive and a definite solution procedure (Djasuli et al., n.d.; Irfan et al., 2019; Rohid et al., 2019). Problem-solving is a high-level cognitive mental (meta-cognitive) that involves knowledge, understanding, application, analysis, and synthesis. Problem-solving ability in mathematics learning emphasizes students' in-depth mastery of mathematical concepts learned at school and the ability to apply them in everyday life. In this case, students are trained in mathematical skills, starting from basic to high levels. Some research results (Valentin and Sam, 2005; Olkum and Toluk, 2002; Carlam et al., 2005; and Rizvi, 2004) show that problem-solving-oriented mathematics learning will make students understand directly the benefits of mathematical material that has been learned (Kingsdorf & Krawec, 2014; Wibowo et al., 2017).

Based on the results of interviews with mathematics teacher at SMP Negeri 3 Teras, Boyolali, the emotional intelligence possessed by students is different. This can be seen when learning in class takes place. In class, when given problem-solving problems, students who are motivated to learn, the results obtained after being corrected show satisfactory results. In contrast to students who lack the motivation to solve math problems, they tend not to try and even wait for other students to do it first. This indicates that students still lack self-motivation to understand and solve problems given by the teacher.

As we know that math is a subject that many students dislike because students already assume that math is complex and not easy to understand. This is one of the students' emotional traits and affects intellectual and emotional intelligence, resulting in common math problem-solving skills.

Based on the description above, the relationship between emotional intelligence and math problem-solving ability can be seen, but it still needs scientific proof. Because at this time, the learning process without good mathematical and emotional intelligence, learning will not take place effectively and the material conveyed to students is not optimal. This encourages researchers to conduct research entitled Relationship between Emotional Intelligence and Mathematical Problem Solving Ability.

Method

This research is a quantitative study using the ex post facto correlation method. Ex post facto research aims to find possible causes of changes in behavior, symptoms or phenomena caused by an event, behavior or things that cause changes in the independent variables that have already occurred (Creswell & Creswell, 2017). The sample in this study were 64 students of SMP Negeri 3 Teras Boyolali. The sample was determined using the purposive sampling technique. Data collection was carried out using questionnaires, tests, and documentation methods. All data were analyzed by descriptive analysis, analysis of research data using the product moment formula, and hypothesis testing.

Result & Discussion

Based on the answers to the emotional intelligence questionnaire with 64 student respondents, the results of descriptive analysis have been processed using the SPSS 22 program. The steps are Analyze - Descriptive Statistics - Frequencies - select Statistic (mean, mode, median, sum, st.deviation, variance) - Continue - Charts (histogram) - OK. More detail can be seen in table 1.

Table 1. Data Analysis Results of Emotional Intelligence Variables

		Emotional Intelligence
N	Valid	64
	Missing	0
Mean		46,59
Median		46,00
Mode		31[a]
Std. Deviation		12,850
Variance		165,134
Sum		2982

Based on table 1, the descriptive research data for the emotional intelligence questionnaire shows that the number (N) of students who filled out the emotional intelligence questionnaire was 64 students, the average (mean) was 46.59, the middle data (median) was 46.00, the data that often appeared (mode) was 31a, the standard deviation value (std. deviation) was 12.850, the variance value (variance) was 165.134, and the total amount (sum) was 2982. The histogram of research data for emotional intelligence is presented in figure 1.

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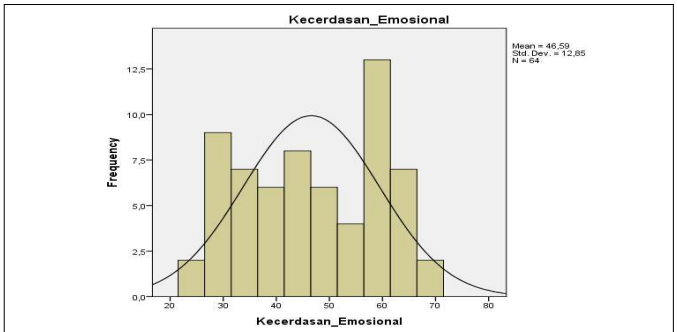

Figure 1. Histogram of emotional intelligence variable

Emotional intelligence is grouped into three levels, namely high emotional intelligence, average emotional intelligence, and low emotional intelligence. Based on the research conducted, the results are in Table 2.

Table 2. Profile of Emotional Intelligence

No	Score Interval	Total	Percentage	Remarks
1	24 – 39	18	28,1%	Low
2	40 – 55	24	37,5%	Middle
3	56 – 71	22	34,4%	High

Based on the answers to the description questions of mathematical problem-solving ability with 64 student respondents, descriptive analysis results were obtained and processed using the SPSS 22 program. The steps are Analyze - Descriptive Statistics - Frequencies - select Statistic (mean, mode, median, sum, st.deviation, variance) - Continue - Charts (histograms) - OK. More detail can be seen in table 3.

Table 3. Data Analysis Results of Mathematical Problem Solving Ability Variables

		Math Problem Solving Ability
N	Valid	64
	Missing	0
Mean		49,98
Median		55,00
Mode		83
Std. Deviation		29,880
Variance		892,841
Sum		3199

Based on table 3, descriptive research data for mathematical problem-solving ability description questions show that the number (N) is 64 students, the average (mean) is 49.98, the middle data (median) is 55.00, the data that often appears (mode) is 83, the standard deviation value (std.

deviation) is 29.880, the variance value (variance) is 892.841, and the total amount (sum) is 3199. The histogram of research data for math problem-solving ability is presented in figure 2.

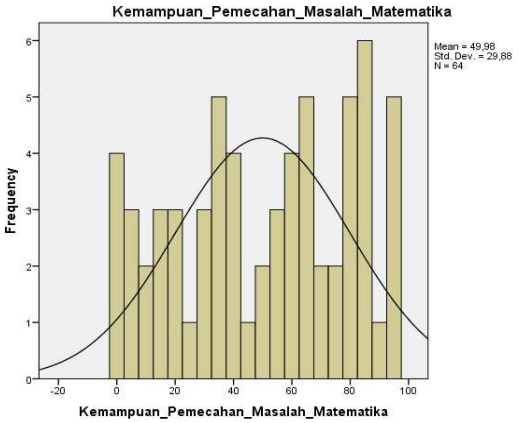

Figure 2. Histogram of math problem-solving ability variable

Math problem-solving ability is grouped into three levels, namely high math problem-solving ability, medium math problem-solving ability, and low math problem-solving ability. Based on the research conducted, the results are in Table 4.

Table 4. Profile of Mathematics Problem Solving Ability

No	Score Interval	Total	Percentage	Remarks
1	0 – 32	18	28,2%	Low
2	33 – 65	23	35,9%	Middle
3	66 – 98	23	35,9%	High

The results of the calculation of the correlation between emotional intelligence and math problem-solving ability using SPSS 22 can be seen in table 5.

Table 5. Correlation Test Results of Emotional Intelligence with Mathematical Problem Solving Ability

Correlations

		Emotional Intelligence	Math Problem Solving Ability
Emotional Intelligence	Pearson Correlation	1	,586**
	Sig. (2-tailed)		,000
	N	64	64
Math Problem	Pearson Correlation	,586**	1

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Solving Ability	Sig. (2-tailed)	,000	
	N	64	64

**. Correlation is significant at the 0.01 level (2-tailed).

The analysis using the SPSS 22 program shows that r_{xy} is 0.586 with the number of samples in this study of 64 students so that at a significance level of 1%, r_{tabel} is 0.2075. Ha is accepted if $r_{xy} > r_{tabel}$; based on the results of these calculations, it can be known $r_{xy} > r_{tabel}$ or 0,586>0,2075 so that it can be concluded that Ha is accepted, meaning that there is a significant relationship between emotional intelligence and math problem-solving ability. As for the correlation coefficient interpretation table, the relationship between emotional intelligence and math problem-solving ability is reasonably strong (Alrajhi et al., 2017; Mérida-López & Extremera, 2017). Students with high emotional intelligence have big math problem-solving abilities, while students with low emotional intelligence have common math problem-solving skills.

Conclusion

Students' emotional intelligence in the low, medium, and high categories are 28.1%, 37.5%, and 34.4%, respectively, and students' math problem-solving ability in the medium, low and high categories are 29.7%, 35.9%, and 34.4% respectively. The results of the analysis show that there is a strong positive relationship between emotional intelligence and students' math problem-solving ability.

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