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EMOTIONAL INTELLIGENCE AND SELF-REGULATED LEARNING OF ELEVENTH-GRADE STUDENTS IN MATHEMATICS LEARNING

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Abstract

The aim of this study was to investigate students' emotional intelligence and self-regulated learning (SRL), and also to find out the relationship between students' emotional intelligence and SRL in mathematics learning. This study was descriptive quantitative research in which the population was grade XI students in a senior high school in Palembang. The technique of sampling used in this study was purposive sampling with the sample number was 33 students. Surveys using questionnaires and interviews were used for data collection. Analysis technique of data in the questionnaire using Spearman Rank test. According to the results, it was found that 18.18% of students had high emotional intelligence, 63.64% were moderate, and 18.18% were low. Furthermore, it was found that 15.15% of students had high SRL, 72.73% were moderate, and 12.12% were low. According to the analysis, there was a strong relationship between emotional intelligence and SRL of grade XI students in mathematics learning. Moreover, it was found that emotional intelligence contributed 58.52% to students' SRL and the remaining 41.48% was influenced by other factors that were not investigated in this study. The result of this study was expected to help teachers to determine learning methods or models that suit students' EI and SRL.

Keywords: Emotional Intelligence, Mathematics Learning, Self-Regulated Learning

Abstrak

Penelitian ini bertujuan untuk mengetahui bagaimana kecerdasan emosional (KE) dan *self-regulated learning* (SRL) siswa kelas XI, serta mengetahui apakah terdapat hubungan antara KE dengan *SRL* siswa kelas XI pada pembelajaran matematika. Penelitian ini adalah penelitian kuantitatif deskriptif dengan populasi siswa kelas XI di salah satu Sekolah Menengah Atas di Palembang. Teknik pengambilan sampel yang digunakan dalam penelitian ini adalah *purposive sampling* dengan ukuran sampel 33 siswa. Survei menggunakan angket dan wawancara digunakan dalam penelitian ini untuk pengumpulan data. Teknik analisis data dalam angket menggunakan uji *Rank Spearman*. Berdasarkan hasil penelitian, diketahui bahwa 18,18% siswa memiliki KE yang tinggi, 63,64% sedang, dan 18,18% rendah. Selain itu, diketahui bahwa 15,15% siswa memiliki *SRL* yang tinggi, 72,73% adalah sedang, dan 12,12% rendah. Hal ini diketahui bahwa terdapat hubungan yang kuat antara KE dan *SRL*. Selain itu, diketahui bahwa KE berkontribusi 58,52% terhadap *SRL* siswa dan sisanya 41,48% dipengaruhi oleh faktor lain yang tidak diteliti dalam penelitian ini. Hasil penelitian ini diharapkan dapat membantu guru menetapkan metode atau model pembelajaran yang sesuai dengan KE dan SRL siswa.

Kata kunci: Kecerdasan Emosional, Pembelajaran Matematika, *Self-Regulated Learning*

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Kurikulum Merdeka started to be implemented in the academic year 2022/2023, which prioritized a holistic approach and gave teachers and students the freedom to determine the learning method that suited their needs. The independent curriculum was implemented to train students' independence in thinking and was expected to increase students' learning independence. Self-regulated learning (SRL) is defined as the ability of students to manage their learning activities (Apriyani, 2024; Guo et al., 2019). Students who can manage their time and plan their learning strategies have more potential to get

effective learning outcomes (LO) (Rizki et al., 2022). The importance of SRL characterizes the process of learning, because when students have an effective SRL, they also understand their learning, can make schedules and steps in learning, and can carry out assessments and improvements in their learning activities, to obtain more effective LO (Abror et al., 2023). However, students still have low SRL, including in mathematics (Purnomo, 2017). That were influenced by several factors, such as lack of interest and motivation to learn, and even students do not feel happy when learning mathematics because of the abstractness of learning (Ansori & Herdiman, 2019). Those causative factors were influenced by students' emotional management (Pasaribu, 2020). The students' emotional management is related to emotional intelligence (EI).

EI is defined as the skill of self-stimulation, dealing with difficulties, controlling mood, managing impulses, sympathizing, and working in groups (Núñez et al., 2023; Winarso & Supriady, 2017). EI was considered the main focus of the independent curriculum because EI was important for students to obtain. The results of previous research stated that if students have a high level of intellectual intelligence, but have a low level of EI, then those students have more potential to have individualistic behavior, not caring about their surroundings, and a pessimistic attitude (negative emotions) when facing difficulties (Sukriadi et al., 2016). These negative emotions could affect the quality and quantity of students' learning (Khodijah, 2014). However, if students have positive emotions, they tend to encourage the learning process and achieve a good LO (Bariyyah & Latifah, 2019). Furthermore, previous research results stated that intellectual intelligence is ineffective without the involvement of EI (Winarso & Supriady, 2017). Thus, students need to have a high level of EI to achieve a good LO. There are several aspects of EI, such as self-awareness, self-regulation, empathy, and social skills (Barkah & Hidayat, 2023).

Previous research related to EI and SRL was still relatively rare. Previous research related to EI and SRL that has been carried out were research by Winarso & Supriady, (2017) and Pasaribu, (2020). Winarso & Supriady, (2017) discussed students' EI and SRL focused on student learning achievement, while Pasaribu, (2020) discussed students' EI and SRL in Social Science Subjects. However, research related to the relationship between students' EI and SRL in Mathematics was rarely conducted. Therefore, the researchers conducted a study related to students' EI and SRL in mathematics learning. In this study, it is described how students' EI and SRL in mathematics learning, and how the relationship between students' EI and SRL. Thus, the purpose of this study was to determine students' EI and SRL, the relationship between students' EI and SRL, then how EI contributed to students' SRL in mathematics learning. The results of this study were expected to support teachers or other researchers in recognizing the relationship between EI and SRL of grade XI students in mathematics subjects, and hopefully useful for teachers to determine learning strategies that follow students' EI.

METHOD

This research was conducted in one of the Senior High Schools in Ilir Barat I Sub-district, Palembang City, academic year 2023/2024. This research used quantitative descriptive methods, with surveys and interviews. The total sample was 33 students from class XI. The sample was selected using a purposive sampling technique. The researchers used a purposive sampling technique to maximize the information obtained from a determined sample based on certain characteristics relevant to the research objectives. This study classified the variables into two categories: the independent variable (X), namely EI, and the dependent variable (Y), namely SRL. This study hypothesized that there was a relationship between EI and SRL of grade XI students in mathematics learning.

The research instruments were in the form of a questionnaire consisting of 30 statements divided into two parts. Part I, related to EI; included 15 positive statements and 15 negative statements. Part II, related to SRL; included 16 positive statements and 14 negative statements. The questionnaire presented alternative responses in checklist format with a Likert scale, namely "Strongly Agree (SA), 'Agree (A)', 'Disagree (D)', and 'Strongly Disagree (SD)'. The point range for each answer choice was 1-4, with points 1 representing SD, 2 representing D, 3 representing A, and 4 representing SA for positive statements, while negative statements include points 1 representing SA, 2 representing A, 3 representing D, and 4 representing SD. The researchers used a 4-point Likert scale on the EI and SRL questionnaires, excluding the neutral answer alternative to reduce the tendency of students to answer questions with a neutral answer and to help researchers organize and analyze student responses (Sukma, 2021).

The EI and SRL questionnaires used in this study were adapted from Parantika (2022). Moreover, the indicators of EI (presented in Table 1) and SRL (presented in Table 2) used in this study were adapted from Parantika (2022).

Table 1. Emotional Intelligence' Indicators

No	*Dimension*	*Indicator*	*Item Number*		*Total*
			Positive	*Negative*	
1	Self-awareness	Self-awareness	1, 3	2, 12	4
		Self-assessment	4, 20	19	3
		Self-confidence	22, 27	10	3
2	Self-regulation	Self-control	14	13, 15	3
		Trustworthiness	29	30	2
3	Motivation	Encouragement to Achieve	7	8	2
		Optimism	9, 16	26	3
4	Recognize Others' Emotions	Understanding Others	5	18, 28	3
		Dealing with Diversity	6	23, 25	3

No	*Dimension*	*Indicator*	*Item Number*		*Total*
			Positive	*Negative*	
5	Communication Skills	Communicability and Influence	17	24	2
		Teamwork	21	11	2
Total			15	15	30

Table 2. Self-Regulated Learning' Indicators

No	*Dimension*	*Indicator*	*Item Number*		*Total*
			Positive	*Negative*	
1	Metacognition	The ability of students to solve math problems	9, 11, 20	8	4
		Having a target in learning mathematics	3	23, 26	3
		Having a learning strategy	4	15, 22, 24	4
		Evaluating the learning process and results	7	25	2
2	Motivation	Having a sense of optimism	1, 12	10	3
		Having persistence in learning mathematics	5	17	2
		Having an epistemic belivef	2, 6	16, 21	4
3	Behavior	Selecting an optimal learning environment	19, 29	28, 30	4
		Exercising self-control to create an optimal learning environment	13, 14, 18	27	4
Total			16	14	30

The data collection was analyzed to determine the students' EI and SRL, and also to determine the relationship between students' EI and SRL in mathematics learning. According to the results of students' questionnaires, the categorization was carried out; high, medium, and low in terms of students' EI and SRL levels in mathematics learning. The interval of categorization criteria is shown in Table 3 (Manalu et al., 2023).

Table 3. Categorization Interval

Interval	Criteria
$X > (M + 1SD)$	High
$(M - 1SD) \leq X \leq (M + 1SD)$	Medium
$X < (M - 1SD)$	Low

Description:
X = Score obtained
M = Mean
SD = Standard deviation

Therefore, based on Table 3, the categories of EI and SRL are presented in Table 4 and Table 5.

Table 4. Categories of Emotional Intelligence

Interval	*Criteria*
$X > 93$	High
$75 \leq X \leq 93$	Medium
$X < 75$	Low

Table 5. Categories of Self-Regulated Learning

Interval	*Criteria*
$X > 92$	High
$74 \leq X \leq 92$	Medium
$X < 74$	Low

The data that have been accumulated in the study were analyzed to determine the relationship between EI and SRL in mathematics learning. The Spearman Rank correlation test was used to analyze the relationship between students' EI and SRL in mathematics learning. The strength of the relationship between students' EI and SRL was determined using the provisions in Table 6 (Prastania & Sanoto, 2021).

Table 6. The Category of Strength Level of Relationship between Variables

Coefficient Value	*Strength Level*
0.00 – 0.25	Very Low
0.26 – 0.50	Sufficient
0.51 – 0.75	Strong
0.76 – 1.00	Very Strong

The coefficient of determination was then calculated using formula (1). The coefficient of determination determined the contribution of an independent variable (EI) to the dependent variable (SRL) by determining the correlation coefficient value of the Spearman Rank correlation test (Winarso & Supriady, 2017).

$$R^2 = r_s^2 \qquad (1)$$

Description :

R^2 = Coefficient of Determination

r_s = Correlation Coefficient

RESULT AND DISCUSSION

Result

The collected data from the EI and SRL questionnaires were used to make the categorizations of students' EI and SRL. The categorizations of students' EI and SRL were conducted as referring to Tables 4 and 5. The categorization of EI and SRL of students is presented in Table 7.

Table 7. The Results of Emotional Intelligence and Self-Regulated Learning Categorization

Variables	Criteria	Frequency	Percentage
EI	High	6	18.18%
	Medium	21	63.64%
	Low	6	18.18%
SRL	High	5	15.15%
	Medium	24	72.73%
	Low	4	12.12%

Furthermore, the Spearman rank correlation test was conducted to determine the relationship between students' EI and SRL. The output of the Spearman rank correlation test is listed in Table 8.

Table 8. Spearman Rank Correlation Test Results

			KE	*SRL*
Spearman's rho	*EI*	*Correlation Coefficient*	0.765**	1.000
		Sig. (2-tailed)	0.000	
		N	33	33
	SRL	*Correlation Coefficient*	1.000	0.765**
		Sig. (2-tailed)		0.000
		N	33	33

**. Significant correlation at 0.01 for 2 tailed.

Table 8 showed that the correlation coefficient value was 0.765, therefore by using formula (1) the coefficient of determination is 0.5852 or 58.52%.

Discussion

Based on the results of the EI questionnaire in table 7, it was obtained that 18.18% of class XI students in one of the high schools in Ilir Barat 1 District Palembang City had high EI, 63.64% were moderate, and the remaining 18.18% were in the low category. Furthermore, the researcher conducted interviews with each of the representatives of students with low, medium, and high EI categories. The students interviewed were selected based on their willingness to be interviewed and their ability to communicate.

The researchers conducted interviews related to several things that were still related to the statements in the questionnaire. First, the researchers conducted an interview related to self-control. The

researchers asked why students chose the answer "disagree" for statement number 13 about not being guilty when mathematics assignments have not been done. The students' answers were as follows:

Student A: *I chose to disagree, because if the task has not been done then I will feel guilty and burdened, so I prefer to do the task at hand.*

Student B: *I feel guilty because I think the task is a responsibility to do independently at home*.

Students A and B were students who had high and medium levels of EI. Based on the answers of student A and student B, it could be seen that students could control their emotions so that they independently did what they wanted to do, which was to complete the assignment. These findings were consistent with previous research which showed that students with high levels of EI could manage their positive emotions and negative emotions (Hastuti & Baiti, 2019). Moreover, according to research by Rahmawati et al., (2018), students who exhibit high levels of EI were more able to regulate their emotions more quickly, effectively facilitating their motivation in engaging their learning activities with greater enthusiasm and thus contributing to a more positive LO.

Furthermore, the researcher asked why students chose the answers "agree" and "disagree" for statement number 22 about bravely solving mathematics problems in front of the class. The students' answers were as follows:

Student A: *I chose the answer "agree" because I believe in my ability that I can solve mathematics problems in front of the class.*

Student C: *I can't solve mathematics problems and if I do it in front of the class I get anxious easily*.

Based on the answers of student A and student C, there were differences in answers. Student A was a student with high EI and was able to control his emotions so that he had confidence in his abilities. Student C was a student with low EI, who was unable to control his emotions, so it was easy to be controlled by negative emotions, feeling anxious about doing mathematics problems in front of the class. These findings were also consistent with other research which showed that students with high EI could regulate their emotions effectively while learning, they also had explicit goals in mind when learning, which contributes to their high motivation to learn (Anggraini et al., 2022).

Based on the SRL questionnaire data collection in table 7, it was found that 15.15% of grade XI students in one of the high schools in Ilir Barat 1 sub-district of Palembang city had high SRL, 72.73% were moderate, and the remaining 12.12% were in a low category. The results of interviews with students showed that several factors influenced the low SRL of students such as students felt difficulty concentrating to learn mathematics, students' social environment was less supportive of learning, students did not have the motivation to learn mathematics, and the students did not like

mathematics subjects because of unpleasant learning experiences in class. These interview findings were consistent with previous research which showed that students' low SRL was attributed to several factors, including the abstract nature of mathematics, which could lead to negative perceptions of the subject and a subsequent decline in interest and motivation among students to engage with mathematics (Ansori & Herdiman, 2019; Kristiyani, 2020).

Furthermore, these results were in line with the research of Woi & Prihatni, (2019), which showed that low SRL was associated with the perception of mathematics as a challenging subject, which caused students to lack confidence. Students with low SRL could be caused by individual anxiety when answering questions, hesitation, and fear in responding to questions, excessive anxiety and worry about achieving good results, and difficulty concentrating on learning math (Saragih & Harahap, 2024). Another research result stated that low SRL could be influenced by unsupportive academic situations, such as students' low intellectual abilities, students' emotional disorders, bad study habits, lack of motivation to learn, low memory, and lack of support for the environment of students' learning process which makes students feel unmotivated to learn mathematics.

Based on the results of Table 8, the Sig. (2-tailed) value is 0.000. Because the Sig. (2- tailed) value <0.05 indicates that there was a relationship between students' EI and SRL. Based on Table 8, the positive correlation coefficient is 0.765. Based on Table 6, the value of 0.765 means that the strength level of the relationship was a strong relationship. These results were consistent with the results of other studies that showed a relationship between students' EI and SRL (Winarso & Supriady, 2017; Pasaribu, 2020). The calculation of the coefficient of determination obtained the coefficient of determination was 0.5852 which showed that there was a contribution of EI to SRL of 58.52%. The remaining 41.48% was affected by other factors that were not included in this study.

CONCLUSION

Based on the results and discussion of the research, it could be concluded that 18.18% of grade XI students in one of the high schools in Ilir Barat 1 Sub-district of Palembang City have high EI, 63.64% are moderate, and 18.18% are low. However, for SRL, it was found that 15.15% of students had high SRL, 72.73% had moderate SRL, and 12.12% had low SRL. Furthermore, the research results indicated a strong relationship between EI and SRL of grade XI students in mathematics learning. Based on the analysis, it was found that EI contributed 58.52% to the SRL of the eleventh-grade students in mathematics learning. The remaining 41.48% was affected by other factors that were not included in this study. The results of the study were expected to help teachers determine learning strategies that follow students' SRL and EI. The results of this study were limited to the relationship between EI and students' SRL in mathematics learning. The researcher did not analyze other factors that may have a relationship or influence students' SRL. Thus, suggestions for future research could analyze other

factors that might have a relationship or influence students' SRL, such as students' social environment, students' learning facilities and infrastructure, and students' learning motivation.

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