The effect of emotional intelligence on the learning achievement of physics high school students

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Abstract: This study aims to assess the impact of emotional intelligence on students' physics learning achievement. Eighty-three students were taken randomly to measure their emotional intelligence. A questionnaire that measured emotional intelligence and learning achievement was obtained through school documentation. Data were analyzed using simple regression. The findings show that empathy is the aspect of emotional intelligence that gets the highest score. The regression results show F_{count} (25.87) > F_{table} (3.96). The findings of this research reveal that there is an influence of emotional intelligence on students' physics learning achievement. Emotional intelligence is a factor in a student's ability to learn and succeed in physics.

Keywords: Emotional intelligence, physics learning achievement, student, empathy

Pengaruh kecerdasan emosional terhadap prestasi belajar fisika siswa SMA

Abstrak: Penelitian ini bertujuan untuk menilai pengaruh kecerdasan emosional terhadap prestasi belajar fisika siswa. Delapan puluh tiga siswa diambil secara acak untuk mengukur kecerdasan emosional mereka. Kuesioner yang mengukur kecerdasan emosional dan prestasi belajar diperoleh melalui dokumentasi sekolah. Data dianalisis menggunakan regresi sederhana. Hasil penelitian menunjukkan bahwa empati merupakan aspek kecerdasan emosional yang mendapat skor tertinggi. Hasil regresi menunjukkan Fhitung F_{hitung} (25,87) > F_{tabel} (3,96). Temuan penelitian ini mengungkapkan bahwa ada pengaruh kecerdasan emosional terhadap prestasi belajar fisika siswa. Kecerdasan emosional merupakan faktor dalam kemampuan siswa untuk belajar dan berhasil dalam fisika.

Kata Kunci: Kecerdasan emosional, prestasi belajar fisika, siswa, empati

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INTRODUCTION

Emotional intelligence (EI) is an important part of the learning process to realize the expected learning achievement. Learning is no longer just a process of transferring knowledge or learning materials to students (Achor & Ngbea, 2022; Nusantari et al., 2021; Obielodan et al., 2021; Rumalolas et al., 2021). Learning has a wider place, and it must be a vehicle for the holistic development of students' potential through the active role of students toward better change (Mbaubedari et al., 2022; Pambudi et al., 2022; Soltura, 2022; Vargas-Hernández & Vargas-González, 2022; Zannah et al., 2022). In this situation, teachers' constructive efforts are urgently needed in developing students' emotional dimensions so that students are increasingly able to face various problems (Ahmed et al., 2019; Fiori & Vesely-Maillefer, 2018; Mishra, 2012), enthusiastic (Lutfiah, 2021; Saptono, 2016; Yulika, 2019), diligent (Anita et al., 2020; Katodhia & C. Sinambela, 2020), responsible (Arikan, 2020; Tarigan et al., 2020), able to establish healthy communication with other individuals or groups (Cherry et al., 2013; Hassan et al., 2014; Hendon et al., 2017), these are the emotional roots that form the basis for achieving the desired success (Moser, 2017; Nauli Thaib, 2013).

The effect of EI on academic achievement has been studied by several researchers. For example, Mohzan et al. (2013) examined the EI of 278 respondents using a questionnaire. The findings of the EI data were then correlated with student achievement. This researcher found that students' EI was at a high level. The researchers' findings also revealed that respondents were aware of their emotions and feelings. Respondents understand that their emotional development is related to their situation. But on the other hand, this research reveals that the strength of the relationship between EI and student achievement is weak. EI is not significantly related to student achievement. Researchers in Iran, namely Zarezadeh (2013), have measured the EI of 330 students and found that EI has an effect on student achievement. They argue that students must manage their mood and stress to stabilize their EI. Adaptability and mood contribute to students' learning ability to knowledge.

Students at a high school in Ende are often unable to attain learning outcomes commensurate with their intellect, according to the findings of observations conducted during physics instruction. There are kids with high intellect who have relatively poor learning outcomes and children with relatively low intelligence who may achieve relatively high learning outcomes. For example, during daily tests, mid-semester tests, and semester exams, students who usually get high scores at certain times may get unsatisfactory grades. The level of emotional intelligence of class X students is not yet stable. This is due to changes in the level of education from junior school education level to high school education level. Students also do not understand the importance of emotional intelligence. Students who have a high level of emotional intelligence will have high learning achievement, and vice versa students who have a low level of emotional intelligence will have low learning achievement, interviews with physics subject teachers evidence this.

The success or failure of students in learning depends on their EI (Alam & Ahmad, 2018; Arbabisarjou & Azizollah, 2013; Bimayu et al., 2020; Eriawati et al., 2017). Several research results on EI in physics learning have also been investigated. For example, Handriani and Subhan (2020) have examined the EI of 31 students in physics learning. This researcher found that EI a contributes to student achievement. Damayanty and Sumadi

(2016) have also studied students' EI in learning physics. They found that EI contributed to numerical ability and physics learning achievement. However, other researchers, Yüksel and Geban (2014), did not find any contribution of EI to physics learning achievement. The importance of EI for student performance in physics is a concern for research. This study aims to assess the impact of emotional intelligence on students' physics learning achievement.

METHOD

This research used eighty-three high school students in Ende. They were taken randomly from a total of 467 students. Students are in grade X, spread over fourteen classes. This research tries to examine the effect of emotional intelligence on high school students physics learning outcomes. Emotional intelligence is measured through a questionnaire and physics learning outcomes are obtained through learning outcomes documents in schools.

Questionnaire sheets and documentation information were used to gather data for this research. The questionnaire sheet was used to measure the level of emotional intelligence. Documentation of midterm test scores is used to see the level of student achievement. The making of an emotional intelligence questionnaire uses five aspects of emotional intelligence, namely self-awareness (S-a), motivation (M), self-regulation (S-r), empathy (E), and skills in building relationships with others (SS).

In this study, the instrument validation was validated by a validator who was considered an expert in the field of physics education and two supervisors. The instrument used is a questionnaire. The validator will test the questionnaire instrument with a range of values of 1, 2, 3, 4, and 5. A score of 1 means very bad, a score of 2 means not good, a score of 3 means not good, a score of 4 means good, and a score of 5 means very good. Researchers will calculate the average value of the three validators.

The assessment component of the questionnaire consists of: 1) Completeness of aspects of the questionnaire, 2) Conformity between indicators and statement items, 3) There are positive statements and negative statements, 4) Questions or statements in the questionnaire totaling 40-50 items or items, 5) The suitability of the question or statement with the answer choices, 6) There are scoring criteria in the questionnaire, 7) The clarity of the instructions for filling out the questionnaire, 8) The use of Indonesian language and standard grammar, 9) The statement or question is in accordance with the variables to be studied.

The first validator is someone who is considered an expert in the field of physics education studies. The first validator scored very well on items 4, 5, 6, 7, and 9; good value on items number 2 and 8; and poor scores on items no. 1 and 3. In the assessment of this questionnaire, the first validator did not provide comments. The second validator is the supervisor 1. The second validator gives very good scores on items number 1, 2, 3, 4, 5, 6, 7, 8 and 9. In this questionnaire assessment, the second validator provides comments 1) improving sentences and typing, and 2) compose sentences according to students' understanding. The third validator is the supervisor 2. The third validator gives very good scores on items number 1, 2, 3, 4, 5, 6, and 8 as well as good scores on items number 7 and 9. components adapted to the level of student development.

Analysis of the influence of emotional intelligence on learning achievement using a simple linear regression test. Emotional intelligence is variable X and learning achievement

in physics is variable Y. The normality test of the data in this study used the chi-square method.

Table 1. Result of validation

No.	Assessment Component	Assessment			Average	C	R (%)
		V1	V2	V3			
1	Completeness of the aspects of the questionnaire.	3	5	5	4.33	VV	75.00
2	Conformity between indicators and statement items.	4	5	5	4.67	VV	88.89
3	There are positive statements and negative statements.	3	5	5	4.33	VV	75.00
4	Questions or statements in the questionnaire totaling 40-50 items or items.	5	5	5	5.00	VV	100
5	The suitability of the question or statement with the answer choices.	5	5	5	5.00	VV	100
6	There are scoring criteria in the questionnaire.	5	5	5	5.00	VV	100
7	Clarity of instructions for filling out the questionnaire.	4	5	4	4.67	VV	88.89
8	The use of Indonesian and standard language writing.	4	5	5	4.67	VV	88.89
9	Statements or questions in accordance with the variables to be studied.	5	5	4	4.67	VV	88.89
	Average	4.33	5.00	4.78	4.70	VV	92.86

Conclusion: The questionnaire that has been developed is feasible to be used as an instrument to measure emotional intelligence.

Note:
V1 : Validator 1   V2 : Validator 2   V3 : Validator 3
C   : Criteria   VV : Very Valid   R : Reliability

$$\text{Percentage of agreement } = \left[1 - \frac{A - B}{A + B}\right] x100\%$$

The instrument developed is said to be reliable if it has a reliability coefficient of ≥ 75% or 0.75. The measurement of the reliability coefficient yielded a value of 92.86 percent, indicating that the produced instrument is dependable.

RESULTS

This research has obtained data on the effect of EI on physics learning achievement. The data has been analyzed by regression, and obtained some findings presented in Tables 2 – 5 and Figures 1 – 2.

Table 2. EI data

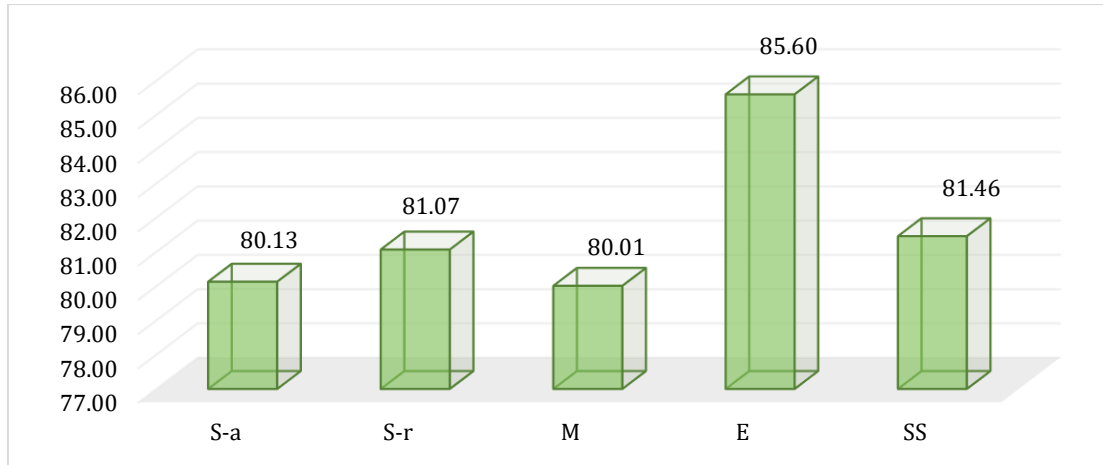| n	∑X	Max.	Min.	Average	Median	Modus	S^2	SD
83	4212	73	32	50.75	51	59	109.24	10.54

Figure 1. Graph of the level of emotional intelligence of students

Average scores on five measures of emotional intelligence were calculated and presented in Figure 1. The average value for the aspect of self-awareness is 80.13; the average for the aspect of self-regulation is 81.07; the average for the motivational aspect is 80.01; the average for the aspect of empathy is 85.60, and the average for the aspect of social skills is 81.46. From the diagram of students' emotional intelligence level, it can be concluded that the highest level of emotional intelligence of students is in the empathy aspect of 85.60.
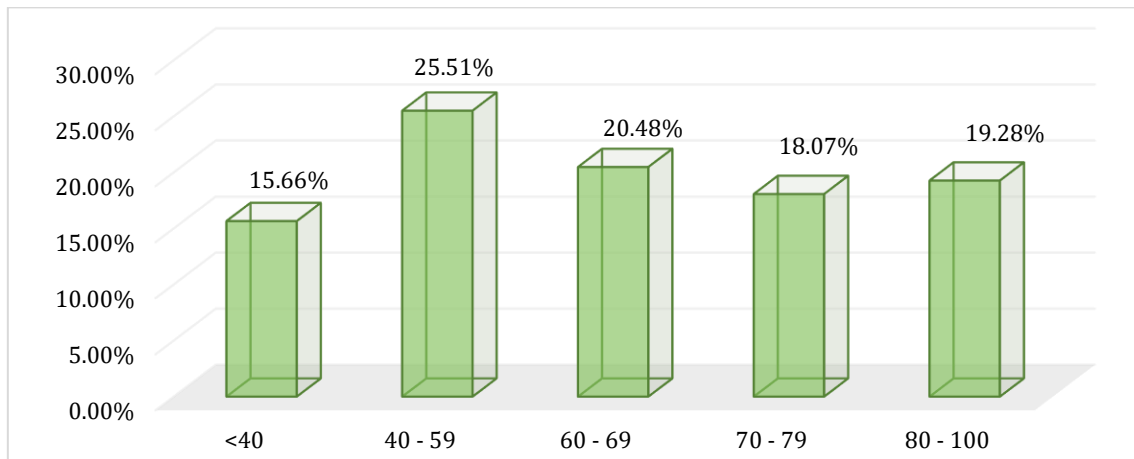

Figure 2. Graph of the percentage of student learning achievements

Figure 2 shows that student achievement in physics is dominated by scores of 40 – 59 (25.51%). There were 19.28% of students who scored 80 – 100, 18.07% achieved a score of 70 – 79, 20.48% achieved a score of 60 – 69, the remaining 15.66% got a score of <40.

Table 3. Physics learning achievement data

n	$\sum X$	Max.	Min.	Average	Median	Modus	S^2	SD
83	5129	98	22	61.80	63	76	347.95	18.65

Table 4. Normality test results

Variable	df	χ^2_{count}	χ^2_{table}	Decision
Emotional intelligence	6	6.546	12.592	Normal
Physics learning achievement	6	4.218	12.592	Normal

Table 4's results for $\chi^2_{count} < \chi^2_{table}$ indicates that the data on EQ and physics learning outcomes follow a normal distribution.

Table 5. Regression linearity

Source of Variance	df	Number of Squares	Average of Square	F$_{count}$	F$_{table}$
Total	83	345479	—	0.03	1.80
Regression (a)	1	316947.48	316947.48		
Regression (b I a)	1	6906.83	6906.83		
Reduction	81	21624.69	266.97		
Mistake (Error)	65	21460.95	330.17		

Based on Table 5, the results of the calculation of the value of F$_{count}$ = 0.03. With the numerator df numerator = k – 2 =18 – 2 = 16 and the df denominator = n – k = 83 – 18 = 65, F$_{0.95(65.16)}$ = 1.80 so that F$_{count}$ < F$_{table}$ then the data has a linear pattern.

The simple linear regression equation between emotional intelligence and physics learning achievement is $\hat{Y} = 17.235 + 0.878X$, indicating that if there is no increase in emotional intelligence, the student's physics learning achievement will be 17.235 and if there is an increase in emotional intelligence of a student by 1, it will have an impact on an increase in student achievement of 0.878. It can be concluded that an increase in emotional intelligence will increase physics learning achievement.

In this study, to test the hypothesis, the researcher used the F test. Based on the results of calculations using the F test, it was obtained that F$_{count}$ (25.87) > F$_{table}$ (3.96) at $\alpha = 0,05$. So, F$_{count}$ > F$_{table,}$ this means H$_o$ is rejected and H$_a$ is accepted. It can be concluded that there is a significant effect between emotional intelligence and student physics learning achievement.

DISCUSSION

Intelligence can be interpreted as the ability to think rationally in solving problems using existing facilities and resources. Emotions are feelings that encourage individuals to respond or behave to stimuli, both from within and from outside themselves. Sensitivity to and mastery over one's emotions and the capacity to use that knowledge to make sound decisions constitute emotional intelligence. Emotional intelligence is related to personal intelligence, including self-regulation, self-awareness, and motivation. While emotional intelligence related to social skills includes social skills and empathy. The five elements of

emotional intelligence are self-regulation, self-awareness, empathy, motivation, and social skills. The five elements of emotional intelligence were used to make an emotional intelligence questionnaire. The calculation of the average value of the five aspects of emotional intelligence of the highest grade students in the empathy aspect is 85.60.

Students who have a high level of emotional intelligence can recognize and understand the emotions of themselves and others well, can control emotions and can use their emotional abilities optimally. Students who have a high level of emotional intelligence are calmer and concentrate well in following the learning process so that it is easier to remember a concept or lesson that has been taught. On the other hand, students who have low levels of emotional intelligence tend to be impatient and their level of self-control is relatively low, causing students to become less focused, not calm in participating in learning, and easily forget the concepts of the subject matter that has been taught. Emotional intelligence is an important part of the learning process to realize the expected learning achievement (AL-Qadri & Zhao, 2021; Arbabisarjou & Azizollah, 2013).

Learning achievement is the mastery of knowledge and information that is able to change students' thinking patterns after experiencing the learning process as indicated by test scores or numbers. In the learning process, the application of emotional intelligence can be carried out widely in various sessions, activities and specific forms of learning. Concrete forms of efforts to develop students' emotional intelligence include developing empathy and caring, teaching honesty and integrity, and teaching problem-solving.

Students who can develop their emotional intelligence well will have skills such as self-understanding skills; managing emotions that are useful for dealing with anger, fear, anxiety, and sadness, and being able to direct emotions in a positive way; social skills, namely relating and empathizing with others; communication skills, namely the ability to communicate effectively with others; and high motivation skills, namely motivating yourself to achieve life goals. Therefore, emotional intelligence is very supportive and influential on physics learning achievement (Neang, 2021; Utami et al., 2019).

Based on simple linear regression analysis, the values of $a = 17.235$ and $b = 0.878$ were obtained. So the simple linear regression equation between emotional intelligence and physics learning achievement is $\hat{Y} = 17{,}235 + 0{,}878X$, indicating that if there is no increase in emotional intelligence, the student's physics learning achievement will be 17.235 and if there is an increase in emotional intelligence of a student by 1, it will have an impact. on increasing student achievement of 0.878. It can be concluded that an increase in emotional intelligence will lead to an increase in physics learning achievement. Based on the results of calculations using the F test, the value of F_{count} (25.87) > F_{table} (3.96) at $\alpha = 0{,}05$ with $df = n - 2 = 83 - 2 = 81$. So, the value of F_{count} >F_{table} reveals that there is a significant influence between emotional intelligence on students' physics learning achievement. These findings are in line with the findings of Damayanty and Sumadi (2016), and Handriani and Subhan (2020) but contradicts the findings found by Yüksel and Geban (2014).

This research demonstrates that emotional intelligence influences learning accomplishment, such that the stronger a student's emotional intelligence, the greater his or her learning achievement. On the contrary, the lower the degree of emotional intelligence of students, the lesser their potential for academic success.

CONCLUSION

On the basis of the study's data analysis and discussion, it can be concluded that emotional intelligence has a considerable effect on students' physics learning performance. Emotional intelligence leads to enhanced learning outcomes in physics. Teachers must consider the emotional intelligence of their pupils while attempting to boost student success.

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